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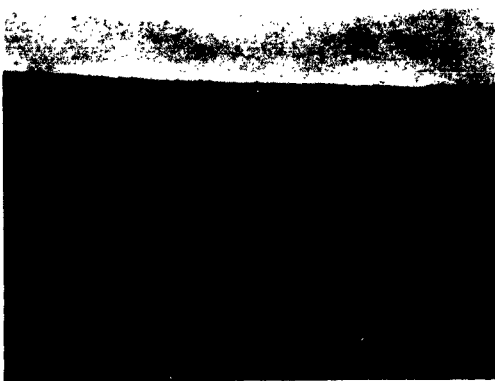
January, 1968

Photographic Documentation

# VEGETATIONAL CHANGES

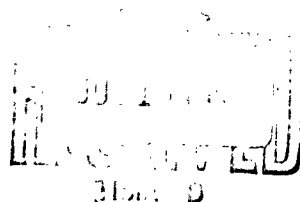
in Northern Great Plains

by Walter S. Phillips  
from Homer L. Shantz'  
records and negatives



Agricultural Experiment Station  
College of Agriculture

The University of Arizona  
Tucson



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Photographic Documentation

# **VEGETATIONAL CHANGES**

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from Homer L. Shantz'  
records and negatives

CONTRACT: Office of Naval Research  
Nonr-2178 (01)  
Project NR 387-018

Agricultural Experiment Station  
College of Agriculture  
The University of Arizona  
Tucson  
January, 1963  
Report 214

## PREFACE

Dr. Homer L. Shantz died June 23, 1958 in the hospital at Hot Springs, South Dakota. He had a slight heart attack on June 22 while in the field at Spearfish, South Dakota rephotographing some of his 1914 photographs.

Dr. Shantz had just completed a resurvey of some of his early work in Africa. Dr. B. L. Turner of the University of Texas accompanied him on this trip, which lasted from September 1956 to April 1957. This paper was in the process of publication at the time of his death, and it was a pleasure for me to undertake to edit and see it through to completion.

Not being content to sit and enjoy his retirement, Dr. Shantz immediately undertook another large project which was to include a resurvey of:

1. The Northern Great Plains
2. The Great Basin desert of Utah
3. The Arizona-Sonoran desert region

It was on the first of these areas that I agreed to go with Dr. Shantz for at least six weeks. On this 1958 trip I learned much of his methods of operation.

Dr. Shantz' early pictures before World War I were mainly taken by means of railroad trips through the region. Often it was the first train to go over a newly built railroad, then he either hired a horse and buggy in some railroad town to survey the surrounding country, or more often he took pictures while the train was waiting on sidings. These pictures from railroad sites were fairly easy to relocate. If you could find the siding or station, you could merely look for the highest knoll visible and nine chances out of ten that was where Dr. Shantz took his pictures.

It was rather difficult to locate some of the Great Plains pictures taken in the days of horse and buggy travel. Dr. Shantz and usually an accompanying botanist would start out in almost any direction they pleased, not worrying about roads. He mentioned several times the trip he took from Hot Springs, South Dakota to the Missouri River on which they camped and just about wandered as they wished.

Slightly before World War I and afterward he used the automobile as a means of travel, except for horseback trips to areas with no roads. It is remarkable to note the number

of times in the last fifty years that some of these roads have been relocated. Modern roads with our modern earth moving equipment have even removed some of the knolls that he stood on to take pictures. It is surprising how much difference fifty feet will make in the angles of a photograph.

With the experience gained in the 1958 trip with Dr. Shantz, I undertook to complete his work on the Great Plains. It has been a much more difficult job than I had anticipated.

In 1959 with Freeman Smith, a graduate student in botany, we left Tucson on June 15 and returned to Tucson on July 8. This trip completed most of the trip that Dr. Shantz and I had planned the year before. With Mr. Freeman Smith's help we relocated many of the very interesting photographs in this report.

The summer of 1960 I was in the field from July 31 to August 21. This time with my wife, Thelma K. Phillips, we were able to tie up most of the loose ends, revisit some questionable areas and in general getting the field notes ready for the report.

One of the major works in the life of Dr. Shantz was his publication with Raphael Zon of *The Natural Vegetation of the United States in the Atlas of American Agriculture*, 1924. Dr. Shantz undertook the grassland and desert areas, whereas Zon was responsible for the forested areas. Dr. Shantz' great interest was in the ecotone between the plains and the forest, and many of the photographs reproduced in this report show that ecotone in various phases of development.

In addition to the pictures shown in the report there are many pictures which we were able to relocate but because of similarity we have not reproduced them here. They will be available for future students to study, however.

The one fact that we would like to stress here is that this is not a finished report. That in the future people nearer to localities mentioned might make more complete studies of some of these areas that seem significant. Materials used in making this report, along with Dr. Shantz' photographs and notes, will be kept on file at the University of Arizona and will be available to the students.

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## Dr. Shantz' Photographs

There are some 14,000 negatives taken by Dr. Shantz on file at the University of Arizona that were given to us by Dr. Shantz' sons. They cover dates from 1904 to 1958. A brief resume of these negatives follows. This list indicates some of the areas covered by Dr. Homer L. Shantz in the course of his lifetime. The photographs are listed by years, starting with 1908, (the pictures before 1908 are mainly glass plates and no accurate records are available, so I have deleted them).

### 1908

May 2 through May 25 — Louisiana  
June 16 through June 23 — Texas  
June 26 through July 1 — Kansas  
July 1 through July 10 — Colorado  
July 13 through July 14 — Nebraska  
July 14 — Nebraska, South Dakota and Wyoming  
July 16 through August 1 — South Dakota  
August 1 through August 8 — North Dakota  
August 8 through August 15 — Montana  
August 17 — Utah  
August 25 through September 17 — Colorado

### 1909

January 29 through March 27 — Washington, D.C.  
May through October 9 — Colorado  
October 18 through October 20 — Nebraska

### 1910

April 12 through July 23 — Colorado  
July 28 — Wyoming  
July 28 through July 31 — Utah  
August 1 through August 2 — Nevada  
August 5 through August 7 — California and Colorado  
August 8 through August 14 — Oregon  
August 16 through August 18 — Montana  
August 18 — South Dakota  
August 27 through September 9 — Colorado  
September 30 through November 19 — Washington, D.C.

### 1911

January 19 through April 4 — Washington, D.C.  
April 13 — Kansas  
June 6 — Nebraska

June 10 through July 22 — Colorado  
July 24 through July 25 — Wyoming  
July 25 through July 26 — Utah  
July 27 through July 28 — Idaho  
July 29 through August 2 — Oregon  
August 4 through August 28 — California  
August 28 — Nevada  
September 9 through September 16 — Colorado

### 1912

January 12 through February 2 — Washington, D.C.  
May 22 — Nebraska  
May 23 through May 27 — Colorado  
May 28 — Wyoming  
May 31 through July 5 — Utah  
July 10 through July 13 — Colorado  
August 3 through August 8 — Utah  
August 16 through August 17 — California  
August 22 through September 18 — Colorado

### 1913

March 11 through March 13 — South Carolina, Georgia and Florida  
March 14 through March 18 — Louisiana  
March 20 — Arizona  
March 21 through April 22 — California  
June 28 through June 30 — South Dakota  
July 6 through August 20 — Colorado  
August 25 through September 3 — Utah  
September 3 through September 7 — Nevada  
September 8 through September 9 — Utah  
September 15 through September 21 — Colorado

### 1914

January 1 through January 10 — Florida  
January 11 — North Carolina and Virginia



May 8 — Colorado  
 May 10 through May 11 — Texas  
 May 13 — Tennessee  
 June 19 through June 27 — Colorado  
 July 8 through July 10 — Kansas  
 July 10 through August 5 — Colorado  
 August 7 through August 10 — South Dakota  
 August 12 through August 24 — Colorado  
 August 30 — Wyoming  
 September 1 through September 10 — Utah  
 September 10 through September 11 — Nevada  
 September 12 through September 20 — California  
 and Colorado  
 September 21 — New Mexico

#### 1915

March 3 — New Mexico  
 March 4 through March 10 — California  
 March 10 — Arizona  
 March 12 — California  
 March 13 through March 19 — Arizona  
 March 20 — Texas and New Mexico  
 March 27 — Washington, D.C.  
 May 29 — Utah  
 June 1 — California  
 June 5 — Oregon  
 June 16 through July 13 — Colorado  
 July 15 through July 16 — North Dakota  
 July 27 through August 24 — Colorado  
 August 25 through August 29 — Utah  
 August 30 through September 4 — Colorado  
 September 5 through September 13 — Utah  
 September 14 — Nevada  
 September 14 through September 16 — California  
 September 23 — Colorado

#### 1916

June 11 through June 20 — Colorado  
 June 20 through June 25 — New Mexico and Texas  
 June 26 — Texas  
 July 12 through August 19 — Colorado  
 August 20 through August 21 — Wyoming  
 August 22 through August 27 — Montana  
 August 28 through September 2 — Washington  
 September 2 through September 6 — Idaho  
 September 6 through September 18 — Oregon  
 September 19 — California  
 September 20 through September 25 — Nevada  
 September 26 through September 28 — Utah  
 September 29 — Nevada  
 September 29 through September 30 — California  
 September 30 through October 2 — Arizona  
 October 4 through October 11 — New Mexico

#### 1917

January 14 — Maryland  
 February 25 through March 24 — Washington, D.C.  
 April 15 — Maryland  
 May 9 through May 10 — Montana  
 May — Texas  
 May 30 — Washington and Maryland  
 July 30 — Oregon  
 August 16 through August 25 — California  
 August 29 through September 7 — Idaho  
 September 7 through September 9 — Oregon  
 September 9 through September 10 — Idaho  
 September 12 through September 23 — Montana  
 September 26 through September 27 — Wyoming  
 September 29 through October 4 — Colorado  
 October 4 — Nevada  
 October 7 through November 15 — California  
 November 21 through November 23 — Colorado  
 November 24 through December 11 — New Mexico  
 December 12 — Colorado  
 December 20 through December 26 — California

#### 1918

January 6 through January 19 — California  
 February 13 through February 16 — Arizona  
 February 19 — Texas  
 April 13 through July 21 — California  
 July 23 through July 24 — Arizona  
 July 24 — Colorado  
 July 25 — Arizona  
 July 27 through July 31 — New Mexico  
 August 7 through August 10 — Montana  
 August 15 through August 18 — Wyoming  
 August 25 — Colorado  
 August 26 through August 27 — Kansas  
 September 2 — Illinois

#### 1919

July 24 through December 30 — Africa

#### 1920

January 3 through September 17 — Africa, France, London and U.S.A.

#### 1921

May 14 through May 16 — California  
 May 17 through May 22 — Nevada  
 May 24 — California  
 May 25 through June 7 — Arizona  
 June 10 through September 10 — Texas  
 September 11 through September 12 — Oklahoma

#### 1922

June 20 through June 30 — Massachusetts  
 September 12 — California

September 18 through September 20 — Texas  
 September 21 — Oklahoma  
 September 22 — Arizona  
 September 25 — Kansas  
 September 30 through October 5 — Colorado  
 October 5 through October 7 — Kansas  
 October 7 through October 10 — Colorado  
 October 16 — Oklahoma  
 October 18 through October 27 — Texas

1923

In Switzerland

1924

In Africa

1925

July 12 through July 13 — Virginia  
 July 14 — North Carolina  
 July 21 — Arkansas  
 August 12 through September 5 — Canada  
 September 5 through September 11 — Montana  
 September 12 through September 14 — Wyoming  
 September 18 through September 28 — Utah  
 September 29 — Colorado

1926

March 21 — New York  
 May 7 — Connecticut  
 May 7 — Washington, D.C.  
 May 11 through May 12 — Pennsylvania  
 May 18 through May 19 — Montana  
 May 21 — Washington  
 May 26 through May 27 — Mexico  
 May 28 through June 2 — California  
 June 8 — Utah  
 June 17 — Colorado  
 June 22 — Minnesota  
 June 23 — Canada  
 June 29 — Wisconsin  
 June 30 — Michigan  
 August 12 through August 22 — New York  
 August 23 — Pennsylvania  
 October 22 through December 20 — Illinois

1927

January 14 through April 16 — Illinois  
 May 14 — Indiana  
 June 11 through June 13 — Virginia  
 June 13 — Indiana  
 June 20 — Iowa  
 June 20 through June 23 — Minnesota  
 June 24 — South Dakota  
 June 25 — Minnesota

June 26 through July 2 — South Dakota  
 July 2 — Nebraska  
 July 2 through July 17 — South Dakota  
 July 17 through August 21 — Wyoming and  
 Montana  
 August 24 — South Dakota  
 October 22 — Indiana

1928

Dr. Shantz was President of the University of Arizona

1929

June 25 — Utah  
 June 26 through November 5 — Arizona

1930

January 3 through May 13 — Arizona  
 July 5 through July 7 — England  
 July 19 through August 15 — Russia  
 August 22 — England  
 October 5 through November 21 — Arizona

1931

February 22 — Arizona  
 April 7 through June 12 — California and Arizona  
 July 2 — New Mexico  
 July 6 — Arizona  
 July 6 through July 8 — Utah  
 July 11 through July 17 — Wyoming  
 July 21 — Montana  
 July 22 — Canada  
 July 25 — Seattle, Washington  
 July 28 — Oregon  
 July 28 — California  
 December 5 through December 11 — Mexico

1932

February 29 through March 7 — Mexico  
 March 23 — Arizona  
 May 5 through May 8 — Mexico  
 June 4 through August 7 — Arizona and Utah  
 December — Arizona

1933

February 20 through September 28 — Arizona  
 December 3 through December 9 — Mexico

1934

February 2 through April 30 — Arizona

1935

March 17 through July 16 — Arizona  
 July 16 — Nevada  
 July 20 through December 23 — Arizona

1936

March 27 through April 10 — Arizona

1937

April 18 through April 26 — Oregon  
May 5 through May 10 — Florida  
May 21 — South Dakota  
May 22 through May 23 — Nebraska  
May 24 through May 28 — Colorado  
June 3 through June 10 — Montana  
June 15 through June 16 — British Columbia  
July 2 through July 4 — Montana  
July 16 — Wyoming  
August 6 through August 9 — California  
August 21 through September 5 — Wyoming  
September 12 — Colorado  
September 18 through September 19 — Arizona  
and Colorado

1938

April 1 — Montana  
April 6 and April 7 — Oregon  
June 1 through August 2 — Alaska  
August 25 — Arizona and Mexico  
September 10 — Minnesota

1939

No Record

1940

February 13 — Wyoming  
June 11 — Colorado  
July 8 — Arizona  
August 2 — Colorado

1941

February 3 through February 4 — Colorado  
and Wyoming  
February 26 — Arizona  
May 25 — Wyoming  
May 31 — Idaho  
June 8 — Colorado  
August 24 — Nevada  
September 4 through November 18 — Colorado

1942

July 1 — Utah  
October 27 — Oregon

1943

July 13 through July 16 — Montana  
September 2 — Arizona

1944-1945-1946-1947

No Record

1948

January 16 — California  
September 8 — Colorado  
November 17 — Arizona

1949

July 3 through July 27 — Colorado  
July 28 — Nebraska  
July 30 through September — Colorado

1950

September 14 — Arizona  
November 1 — Colorado

1951

May 11 — Arizona  
May 27 — Mexico  
July 12 — California  
July 25 — California  
August 31 — Utah  
September 12 — California

1952

February 7 — California  
April 23 through April 25 — Arizona

1953

June 27 through July 2 — Colorado

1954

April 6 — California

1955

May 10 through June 15 — Colorado

1956

April 5 through May 10 — Arizona  
September 7 through December 19 — Africa

1957

January 1 to April 14 — Africa

1958

June 1958 Dr. Shantz started on retake of old photographs in Great Plains. See itinerary in this report.

## Negative Numbering System of Dr. H. L. Shantz

A word of explanation is made here to explain the system used in designating individual negatives. This is the system that Dr. Shantz used from the beginning with the exception of probably 50 negatives 1908 and before.

1. First he started at the beginning of each year (Jan. 1) so the year that is indicated on these labels indicates the year in which the picture was taken.
2. He used film packs almost consistently throughout his lifetime and he started each film pack at the beginning of the year with the capital letter A. The second film pack he used was B, etc. until the end of the alphabet. If he used more than 26 film packs during the year, he then started over with AA and BB and so on as far as was needed.
3. Each film pack contains 12 negatives and these were given numbers 1 to 12. For example, H-7-1911 can be read this way. H. indicates that this was the 8th film pack used during 1911 and that this negative was No. 7 in the pack. A double letter for instance BB-6-1911 would indicate that this was the 28th film pack, negative No. 6 for 1911.
4. On occasion a picture marked W.S.P. with a number following is one of my negatives that I took in addition to the original photograph. These were taken with a different camera and a different lens and in some cases they proved to be so much better than I have used those. The numbers as they appear after my initials, are filed with the Botany Department, University of Arizona.

Almost all of Dr. Shantz' negatives were taken with various 4 x 5 negative size cameras. This was a large camera of the view type and he used it on a tripod. Sometimes he used a smaller hand camera with a smaller size negative. These were mainly pictures taken from trains with a hand held camera. These negatives he indexed separately using letters, lower case, a, b, etc. For example, b-4-1911 indicates small negative size, negative No. 4 on that roll taken in 1911.

During the course of the years there are a few other symbols that came up usually as the result of mistakes or corrections. Occasionally he had two film packs labeled, for instance C. He then uses C and C<sup>1</sup>.

Some of his earliest negatives were merely numbered with the year following. The last instance of this is 1908 in which he has pictures or negatives labeled 29-1908. This means that this is the 29th picture taken during 1908. However, during the latter part of 1908 he switched to his letter and number system which was used up to the end of his work.

Dr. Shantz' sons turned these negatives over to the University of Arizona where they will be kept on permanent file in either the Botany Department or in the Library. His field note books and various other scientific matters are also on file in the Shantz collection in the University of Arizona Library. These will be available for use as needed by people in the future.

## Introduction

The photographs in this report are arranged alphabetically and by states and the towns within each state are also alphabetically listed. The number after a city or town indicates that there is more than one picture used from the area.

### MONTANA

Danvers (3)  
Fairview  
Forsyth  
Gardiner  
Grassrange (2)  
Havre (2)  
Lewiston (3)  
Lombard  
Moccasin  
Roundup (2)  
Townsend (2)  
Valentine (2)

### NEBRASKA

Crawford (2)  
Long Pine  
Sydney

### NORTH DAKOTA

Fort Lincoln  
Fryburg (4)  
Hettinger  
Mandan (2)

### SOUTH DAKOTA

Arpan  
Belle Fourche  
Belvidere (2)  
Blunt  
Custer Park

Deadwood  
Fort Pierre  
Gregory  
Highmore (2)  
Hot Springs  
Kadoka (3)  
Newell (2)  
Pine Ridge  
Redfield  
Rosebud  
Rumford  
Spearfish (3)  
Sturgis  
Timberlake (2)  
White River  
Whitewood (2)  
Wounded Knee

### WYOMING

Buffalo (2)  
Casper (3)  
Cody (2)  
Crazy Woman Creek (2)  
Devil's Tower  
Grand Teton  
Hulett (2)  
Story (2)  
Sundance  
Ten Sleep  
Thermopolis

*Itineraries . . .*

## Great Plains Project

Three separate trips were made in three successive summers, (1958, 1959 and 1960). The itinerary we followed is given in the following digest with the date in each case being the date we left the overnight stopping place. This itinerary does not include much backtracking and sideroad travel for locating given sites, but does include the main journeys from town to town. After we arrived at a given location, it sometimes took fifty miles of driving before we were able to locate the exact location on a side road that was at one time probably the main road.

In order to keep the State and County Highways as little confused as possible, the Rand McNally Road Atlas of the United States was used. The edition copyrighted in 1958 was used for the three years. This atlas will be on file in the Botany Department, University of Arizona, for future reference with the trips marked on the individual maps.

June 10 — June 23, 1958

Date	Starting Place	(Mileage 4,819)
June 10, 1958	Tucson, Arizona	
	U. S. Highway 80 to Lordsburg, New Mexico. State 180 to Silver City, New Mexico.	
June 11, 1958	Left Silver City, New Mexico	
	U. S. 260 to Stevens, New Mexico State 12 to Datil	
	U. S. 60 to Socorro, U. S. 85 to Santa Fe and 285 to Espanola, New Mexico.	
June 12, 1958	Left Espanola, New Mexico	
	U. S. 285 to Alamosa, Colorado and Denver	
	From Denver, Colorado on U. S. 6 to Fort Morgan, Colorado	
June 13, 1958	Left Fort Morgan, Colorado	
	U. S. 6 to Sterling, Colorado, then State Highway 113 to Nebraska and State Highway 19 to Sydney, Nebraska, then State Highway 19 to Alliance and State 2 to Hemingford, then State 87 west to State 2 to Crawford, Nebraska.	

Date	Starting Place
June 14, 1958	Left Crawford, Nebraska State Highway 2 to South Dakota State Line, State Highway 87 to Hot Springs, State Highway 79 to Oelrichs, and U. S. 18 to Pine Ridge.
June 15, 1958	Left Pine Ridge, South Dakota East on State Highway 18 to County Road to Wounded Knee. Back to U. S. Highway 18 at Batesland. U. S. 18 to State Highway 73 north on 73 to Kadoka.
June 16, 1958	Left Kadoka, South Dakota U. S. 16 to Belvidere, South Dakota then south on State 40 to White River, South to Mission on U. S. 83.
June 17, 1958	Left Mission, South Dakota Left Mission for Rosebud Indian Reservation. Traveled on dirt roads to Rosebud, St. Francis and Harrington, then back to Lakeview, then to Krokston, Nebraska on U. S. Highway 20 to Valentine, Nebraska and on to Atkinson, Nebraska.
June 18, 1958	Left Atkinson, Nebraska On Nebraska State Highway 11 to Fairfax, South Dakota on U. S. 18 east on U. S. 18 to Fort Randall Dam, then to Fairfax on U. S. 18 to Gregory, north on State Highway 47 to Reliance, east on U. S. 16 to Chamberlain.
June 19, 1958	Left Chamberlain, South Dakota On U. S. 16 to Vivian, South Dakota, North on U. S. Highway 83 to Pierre, South Dakota, West on U.S. Highway 14 to Wall, South Dakota.
June 20, 1958	Left Wall, South Dakota On U. S. Highway 14 to Rapid City, to Hot Springs on U. S. Highway 16 and U. S. Highway 85.
June 21, 1958	Left Hot Spring, South Dakota Went back to Rapid City and Sturgis on U. S. Highway 14, then to Whitewood and Deadwood.
June 22, 1958	Left Deadwood, South Dakota To Spearfish, South Dakota. At Spearfish at the Junction of U. S. Highway 14 and 85, Dr. Shantz lay down as he was not feeling well. Eventually we went back to Spearfish to the motel and I called a doctor who recommended a hospital in Rapid City. I took him to Rapid City, arriving at 8:00 o'clock p.m.
June 23, 1958	Rapid City, South Dakota Dr. Shantz passed away in the hospital at 3:00 a.m. on June 23, After making arrangements with the mortuary I came straight down to Tucson.

June 15 — July 8, 1959

Date	Starting Place	(Mileage 7,007)
June 15, 1959	Left Tucson, Arizona U. S. 80 to Florence Junction, 60 to Superior, Arizona where I picked up Freeman Smith as field man on trip. Went on to Globe, Arizona, Showlow and Magdalena, New Mexico on U. S. Highway 60.	

Date	Starting Place
June 16, 1959	Left Magdalena, New Mexico for Socorro North on U. S. 85 to Buena Vista, Colorado, then U. S. 24 and State 9 to Frisco, Colorado.
June 17, 1959	Left Frisco, Colorado North to Kremmling, Colorado. U. S. 40 to Granby, Colorado. U. S. 34 to U. S. 287 and Fort Collins, Colorado. North on U. S. 87 to Cheyenne, Wyoming. U. S. 85 to Newcastle, Wyoming.
June 18, 1959	Left Newcastle, Wyoming Went to Upton, Wyoming on U. S. 16. From Upton, Wyoming we then went to Sundance on State Highway 116, then U. S. 14 to Devil's Tower. State 24 to Hulett, Wyoming, then east to Belle Fourche, South Dakota.
June 19, 1959	Left Belle Fourche, South Dakota East on U. S. Highway 212 on county road east of Orman Dam to Arpan, South Dakota, then returned to U. S. 212 to Newell, South Dakota, then south on State 79 to Sturgis and U. S. 14 to Spearfish.
June 20, 1959	Left Spearfish, South Dakota North to Belle Fourche, then east on U. S. 212 to Faith, South Dakota.
June 21, 1959	Left Faith, South Dakota East to State Highway 65 and north to Timberlake, on dirt road to Whitehorse and Ridgeview. West on U. S. 212 to State Highway 63, then north on 63 to Firesteel. South on State 63 to U. S. 212, then east to Gettysburgh. South on U. S. 83 to Blunt and U. S. 14 to Pierre, South Dakota.
June 22, 1959	Left Pierre, South Dakota U. S. Highway 14 to Blunt and then to Miller, South Dakota. North on State Highway 45 to U. S. 212, east to Redfield then on to Clark, South Dakota and return to Redfield.
June 23, 1959	Left Redfield, South Dakota On U. S. Highway 281 to Aberdeen, South Dakota, then to Jamestown, North Dakota, then west on U. S. 10 to Bismarck, North Dakota.
June 24, 1959	Left Bismarck, North Dakota Went across river to Mandan, North Dakota, and south to Fort Lincoln State Park. Rained most of the day.
June 25, 1959	Left Bismarck, North Dakota West on U. S. Highway 10 to Dickinson, North Dakota, on old section line road South of U. S. 10 through Fryburg, North Dakota, to Medora, North Dakota. Returned to Belfield, then South on U. S. Highway 85 to Bowman, North Dakota, East on U. S. 12 to Scranton and Hettinger, North Dakota, then returned West on U. S. 12 to Baker, Montana, North on State Highway 7 to U. S. 10 to Glendive, Montana.
June 26, 1959	Left Glendive, Montana West on U. S. Highway 10 to Billings, Montana
June 27, 1959	Left Billings, Montana North on U. S. Highway 87 to Roundup, Montana, east on State 6 to Melstone, Montana, then returned to Roundup, Montana.
June 28, 1959	Left Roundup, Montana Went to Grassrange, Montana, east on U. S. 18 to Winnett, Montana, North of Valentine, Montana, then west to Roy, Montana, then State 19 to Lewiston, Montana.

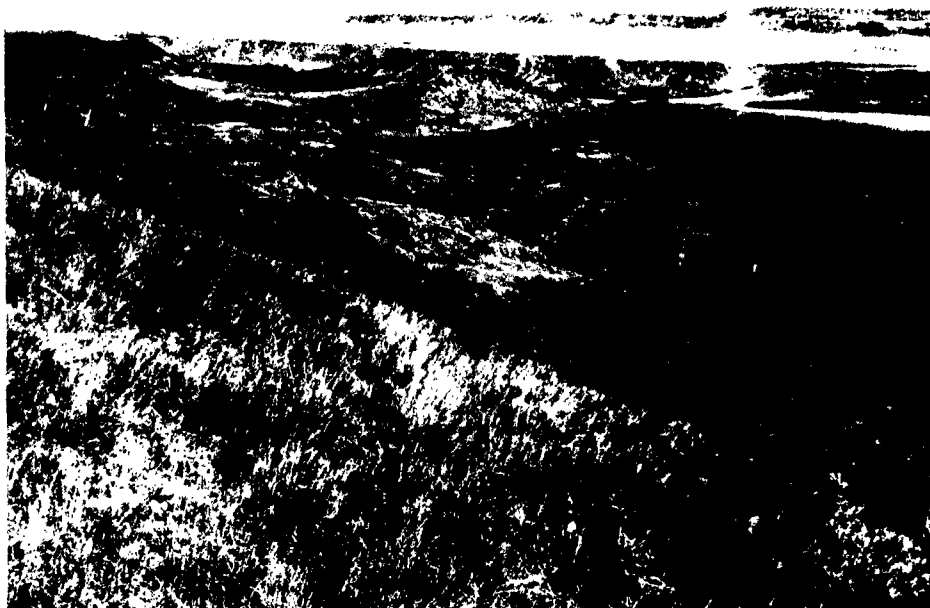


Date	Starting Place
June 29, 1959	Left Lewiston, Montana County gravel road to Denton, Montana, Danvers, Montana, then back to Moccasin. Returned to Lewiston, Montana.
June 30, 1959	Left Lewiston, Montana On U. S. Highway 87 to Great Falls, Montana to Helena, Montana, then U. S. 91 and on to Butte, Montana.
July 1, 1959	Left Butte, Montana East on U. S. 10-S to Three Forks, Montana, north on U. S. 10-N to Townsend, Montana, then returned to Toston, Montana and dirt road to Lombard, Montana. Returned to Three Forks, Montana.
July 2, 1959	Left Three Forks, Montana On U. S. Highway 191 to West Yellowstone, Montana through park and U. S. 20 to Cody, Wyoming.
July 3, 1959	Left Cody, Wyoming On State Highway 14 to Powell, Wyoming and Deaver, Wyoming. North on U. S. 310 to Frannie, Wyoming, then returned to Deaver, Wyoming. South on U. S. 310 to Greybull, then U. S. 14 to Sheridan, Wyoming.
July 4, 1959	Left Sheridan, Wyoming On U. S. 87 south to Buffalo, Wyoming.
July 5, 1959	Left Buffalo, Wyoming U. S. 16 to Worland, Wyoming south on State Highway 789 to Shoshoni, Wyoming. East on U. S. Highway 20 to Casper, Wyoming.
July 6, 1959	Left Casper, Wyoming Southwest on State Highway 220 to Muddy Gap, Wyoming, then U. S. 287 to Rawlings, Wyoming.
July 7, 1959	Left Rawlings, Wyoming On U. S. 30 to State Highway 789 to Craig, Colorado, then to Rifle, Colorado on U. S. 6 to Grand Junction, Colorado and on to Crescent Junction, Utah, then south on U. S. 160 to Monticello, Utah. State Highway 47 to Mexican Hat, Utah, through Monument Pass, Arizona to Tuba City, Arizona, then south on U. S. 89 to Flagstaff, Arizona.
July 8, 1959	Left Flagstaff, Arizona Went to Globe, Arizona, where I left Freeman Smith, then came on to Tucson.

July 31 — August 21, 1960

Date	Starting Place	(Mileage 6,334)
July 31 to Aug. 3, 1960	Left San Francisco, California (Trip was shorter to add this to my trip to San Francisco, rather than returning to Tucson.) San Francisco coastal highway to Crescent City, California on U. S. 101. U. S. 199 to Crater Lake Junction, Oregon. U. S. 97 to U. S. 30, west to U. S. 410 and Walla Walla, Washington, then U. S. 195 to U. S. 96 to Kellogg, Idaho. U. S. 10 to Missoula, Montana and on to Helena, Montana.	
August 4, 1960	Left Helena, Montana To Townsend, Montana and to Lombard, Montana on dirt road. Returned to Helena, Montana.	

Date	Starting Place
August 5, 1960	Left Helena, Montana Back to Townsend, Montana on State Highway 6 to White Sulphur Springs. U. S. 89 to Great Falls, Montana. U. S. 87 to Havre, Montana.
August 6, 1960	Left Havre, Montana To Harlem, Montana on U. S. 2, then county road to Landusky, Montana, on to Roy and Lewiston, Montana.
August 7, 1960	Left Lewiston, Montana Went to Judith River areas and Danvers, Montana, then returned to Lewiston, Montana.
August 8, 1960	Left Lewiston, Montana Went to Grassrange on U. S. 87, then to Billings, Montana.
August 9, 1960	Left Billings, Montana On U. S. 10 to Glendive, Montana. North on State Highway 16 to Fairview, Montana, then to Watford City, North Dakota.
August 10, 1960	Left Watford City, North Dakota South on U. S. 85 to Belle Fourche, South Dakota.
August 11, 1960	Left Belle Fourche, South Dakota To Spearfish to Deadwood and Hot Springs, South Dakota. South on State Highway 79 and Nebraska 19 to Crawford, Nebraska.
August 12, 1960	Left Crawford, Nebraska On Nebraska 2, South Dakota 87 to Rumford, South Dakota, then to Sundance, Wyoming.
August 13, 1960	Left Sundance, Wyoming To Upton, Wyoming, west on 14 to Gillette and Buffalo, Wyoming, then to Sheridan, Wyoming.
August 14, 1960	Left Sheridan, Wyoming Over Big Horn Mountains to Greybull. North to Lovell and Frannie, Wyoming. Then returned to Cody, Wyoming on U. S. 20.
August 15, 1960	Left Cody, Wyoming West on U. S. 20 to Yellowstone Park. Snow storm and rain for three days. Stayed at Gardiner, Montana.
August 16-17-18, 1960	In Gardiner, Montana Rain and snow made it impossible to see the mountains and take pictures.
August 18, 1960	Left Gardiner, Montana On U. S. 89 to Grand Tetons and String Lake. South to Montpelier, Idaho.
August 19, 1960	Left Montpelier, Idaho Went to Ogden and Salt Lake City, down U. S. 89 to Fairview, Utah.
August 20, 1960	Left Fairview, Utah South on 89 to Jacob's Lake, Arizona.
August 21, 1960	Left Jacob's Lake, Arizona On U. S. Highway 89 to Tucson, Arizona.



**LOCATION:**

Danvers, Montana

Near Lewiston one mile north of Danvers cutoff on road to Denton, on old road abandoned and fenced off.

**ORIGINAL PICTURE:**

September 18, 1917, Shantz P-1-1917 (top).

**RETAKE:**

June 30, 1959, W.S.P., H-2-1959 (bottom).

**DESCRIPTION:**

Looking WNW the original vegetation is *Bouteloua* spp. and *Koeleria cristata* (L.) Pers. *Carex filifolia* Nutt. is abundant in flat areas. Shrub in grass is *Artemisia frigida* Willd. *Shepherdia canadensis* (L.) Nutt. is a common shrub on the hillsides and bottom lands. Erosion not evident. Trees in creek bottom are better developed in later picture.



**LOCATION:**

Danvers, Montana

Near Lewiston one mile north of Danvers cutoff on road to Denton, on old road abandoned and fenced off.

**ORIGINAL PICTURE:**

September 18, 1917, Shantz O-8-1917 (top).

**RETAKE:**

June 30, 1959, W.S.P. H-9-1959 (bottom).

**DESCRIPTION:**

Looking up a side creek bottom from Judith River. *Andropogon scoparius* Michx. was abundant in the original picture, but very rare in the retake. *Shepherdia canadensis* (L.) Nutt. along creek much increased.



**LOCATION :**

Danvers, Montana

Near Lewiston, Montana, one mile north of Danvers cutoff on road to Denton, Montana, looking over Judith River Valley, on old road abandoned and fenced off.

**ORIGINAL PICTURE :**

September 18, 1917, Shantz O-12-1917 (top).

**RETAKES :**

June 30, 1959, W.S.P. H-6-1959 (bottom).

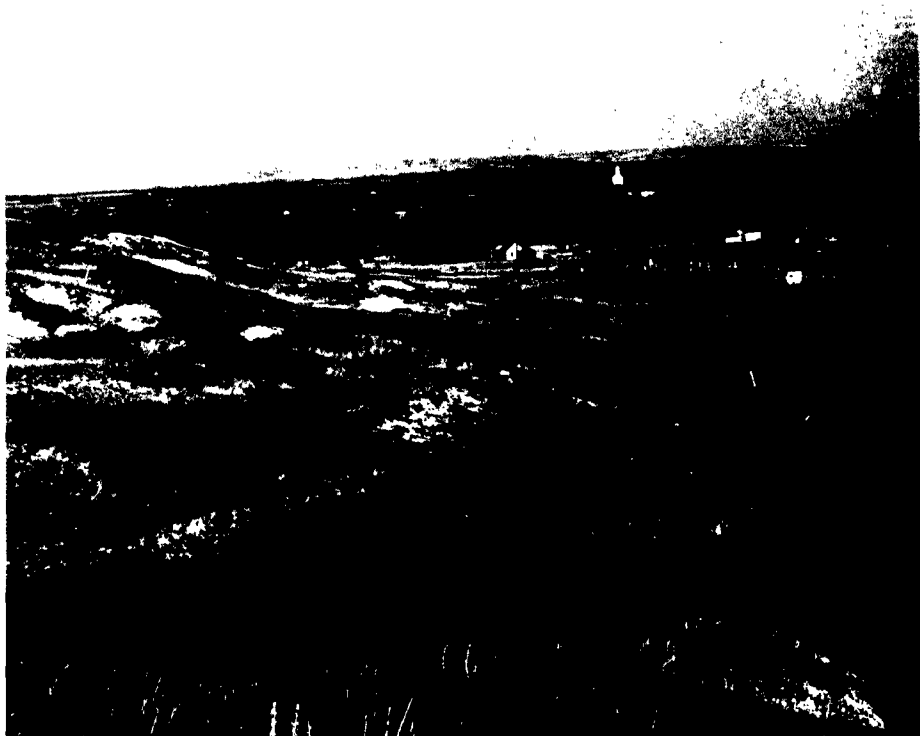
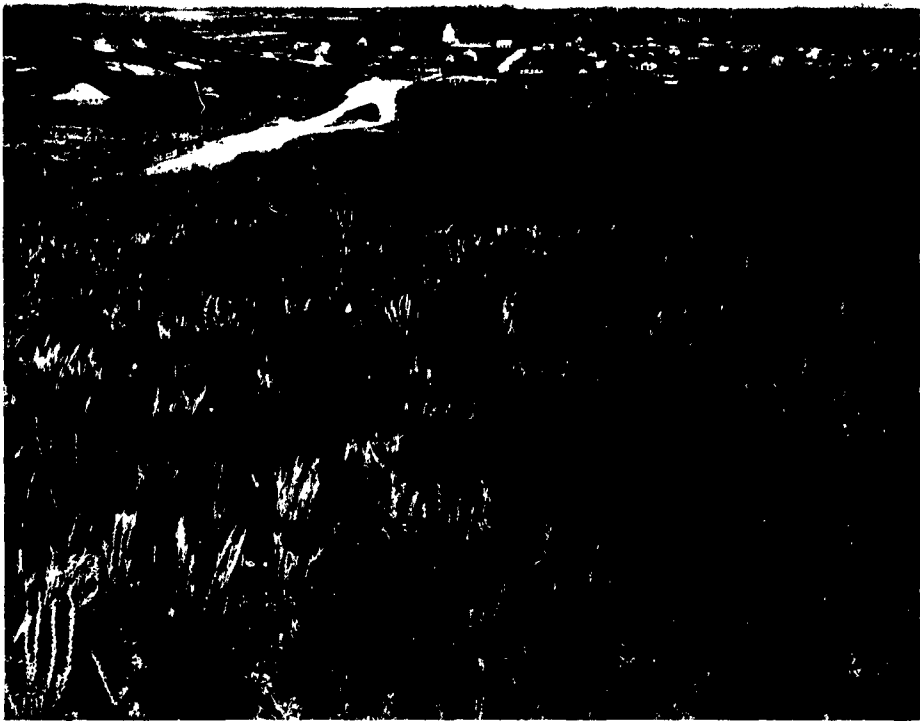
**DESCRIPTION :**

The original vegetation was *Bouteloua* spp. and *Koeleria cristata* (L.) Pers. *Carex filifolia* Nutt. is abundant in flat areas. Shrub in grass is *Artemisia frigida* Willd. *Shepherdia canadensis* (L.) Nutt. is a common shrub on the hillsides and bottom lands.

The river has meandered and changed its course several times since the original picture. *Pinus ponderosa* Dougl. on the mountains is much thicker.

See also W.S.P. H-6 and H-7-1959, from same area.





**LOCATION:**

Fairview, Montana

Picture was taken east of town beyond cemetery which is visible in both pictures.

**ORIGINAL PICTURE:**

August 24, 1916, Shantz O-3-1916 (top).

**RETAKE:**

August 9, 1960, W.S.P. D-3- and D-4, 1960 (bottom).

**DESCRIPTION:**

Typical of most of the Great Plains, a tremendous increase in the foliage trees in the town has taken place. The hill from which Dr. Shantz took the original picture has been dug out for gravel, an activity that was taking place in 1916. Dr. Shantz' original vegetation consisted of *Koeleria cristata* (L.) Pers., *Andropogon scoparius* Michx., *Stipa comata* Trin. and Rupr., and *Bouteloua oligostachya* (Nutt.) Torr. The disturbance of the gravel pit has interfered with the native vegetation, however, all species are present.



**LOCATION:**

Forsyth, Montana  
In town by railroad station on U. S. Highways 10 and 12.

**ORIGINAL PICTURE:**

August 8, 1908, Shantz K-7-1908 (top).

**RETAKE:**

June 27, 1959, W.S.P. F-5-1959 (bottom).

**DESCRIPTION:**

The town has grown considerably and the main highway now runs along base of hills. Trees on hillside are much scarcer in recent picture, probably due to local cutting.

See also W.S.P. F-4-1959, from the same area.



**LOCATION:**

Gardiner, Montana

Just north of Gardiner before coming into town near the Flamingo Motel.

**ORIGINAL PICTURE:**

August 10, 1908, Shantz K-11-1908 (top).

**RETAKE:**

August 18, 1960, W.S.P. F-11-1960 (bottom).

**DESCRIPTION:**

*Artemisia tridentata* Nutt. in the original picture has completely disappeared in the retake of 1960. The shed that shows on the left side of the old picture was probably a cattle or sheep shed and overgrazing no doubt accounts for the lack of grasses. The foundation of this shed is still present, but grasses have taken over in the foreground.

See also Shantz K-10-1908 and K-12-1908.



**LOCATION :**

Grassrange, Montana  
Five miles southwest of Grassrange on county dirt road.

**ORIGINAL PICTURE :**

September 23, 1917, Shantz R-8-1917 (top).

**RETAKE :**

June 29, 1959, W.S.P. G-5-1959 (bottom).

**DESCRIPTION :**

This picture illustrates a remarkable regrowth of the *Pinus ponderosa* Dougl. The vegetation in the foreground is little changed.





**LOCATION :**

Grassrange, Montana  
Eleven and one half miles southwest of Grassrange.

**ORIGINAL PICTURE :**

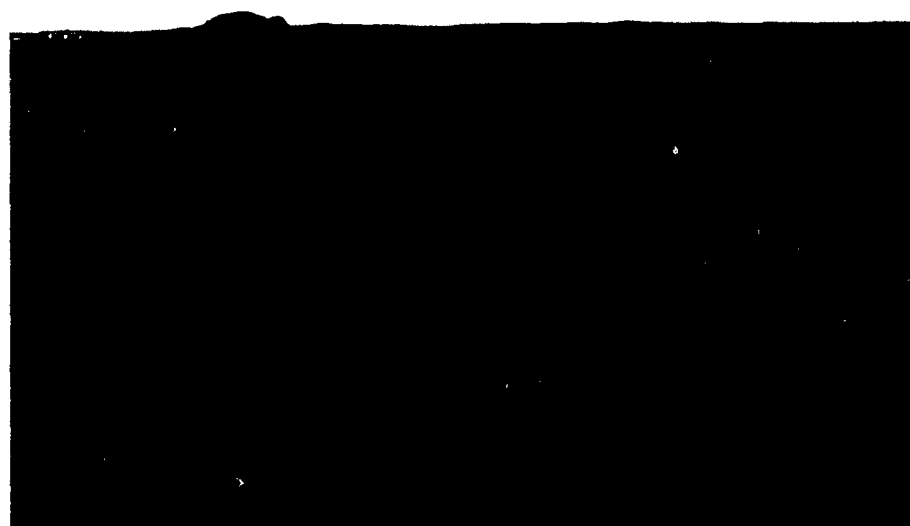
September 23, 1917, Shantz R-9-1917 (top).

**RETAKE :**

June 29, 1959, W.S.P. G-6-1959 (bottom).

**DESCRIPTION :**

Clumps of *Juniperus* growing on the side of a wash cut in the original picture. Dr. Shantz mentions both *Juniperus horizontalis* Moench and *Juniperus communis* L. In the retake there was only one plant of *Juniperus communis* L. left. The shrub in the foreground is mainly *Shepherdia canadensis* (L.) Nutt.



**LOCATION :**

Havre, Montana

Taken along U. S. Highway 87 just southwest of Havre, Montana, where cutoff from U. S. 87 goes through to town.

**ORIGINAL PICTURE :**

August 24, 1916, Shantz 0-11-1916 (top).

**RETAKE :**

August 6, 1960, W.S.P. B-4-1960 (bottom).

**DESCRIPTION :**

Originally the most conspicuous plant was *Artemisia frigida* Willd. The grass being *Bouteloua oligostachya* (Nutt.) Torr. with some *Selaginella densa* Rydb. In the retake this has been converted to wheat fields. The building just to the left of the butte in the background is the airport.



**LOCATION:**

Havre, Montana

In the north branch of the Montana Experiment Station at Fort Assiniboine.

**ORIGINAL PICTURE:**

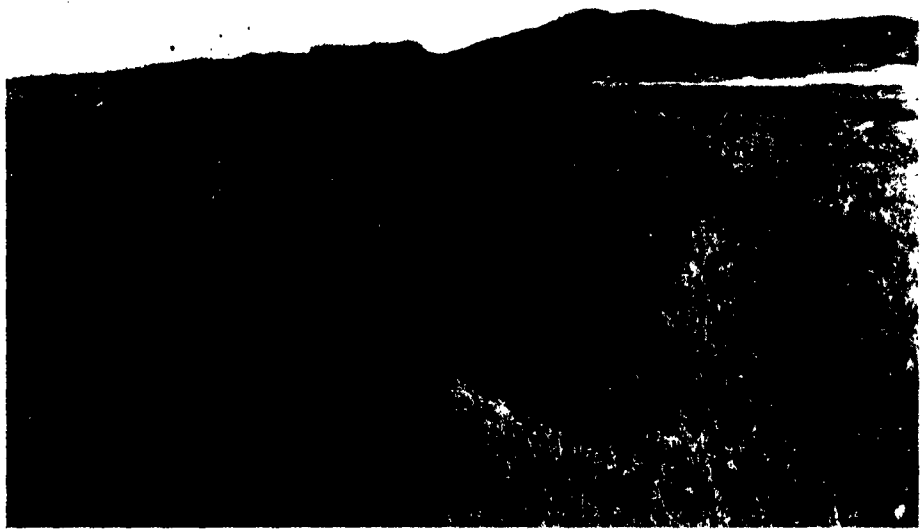
August 24, 1916, Shantz 0-10-1916 (top).

**RETAKE:**

August 6, 1960, W.S.P. A-10-1960 (bottom).

**DESCRIPTION:**

The sage is *Artemisia cana* Pursh. The grass is *Bouteloua oligostachya* (Nutt.) Torr. along with *Stipa comata* Trin. and Rupr. *Artemisia cana* Pursh. is still present in uncultivated areas.



**LOCATION :**

Lewiston, Montana

Five and one tenths of a mile north of Lewiston, Montana, on road that leads through Hanover.

**ORIGINAL PICTURE :**

September 16, 1917, Shantz N-10-1917 (top).

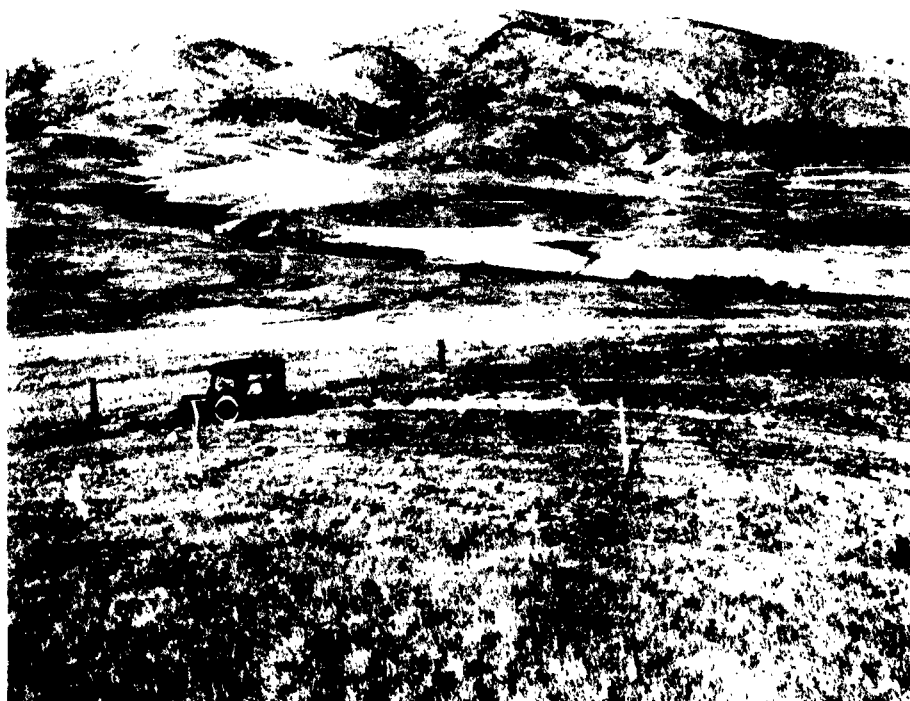
**RETAKE :**

August 6, 1960, W.S.P. B-5-1960 (bottom).

**DESCRIPTION :**

The original grass cover consisted of *Bouteloua gracilis* (H.B.K.) Lag., *Koeleria cristata* (L.) Pers. and *Agropyron smithii* Rydb. with pines on the hills. In the retake the same plants are still present, but *Koeleria cristata* (L.) Pers. seems to be dominant.





**LOCATION:**

Lewiston, Montana

Twenty six miles northeast of Lewiston, Montana on unpaved road leading to Roy.

**ORIGINAL PICTURE:**

September 23, 1917, Shantz R-3-1917 (top).

**RETAKE:**

June 30, 1959, W.S.P. No. 2119 (bottom).

**DESCRIPTION:**

*Stipa* and *Bouteloua* spp. are the main grasses in both pictures. *Pinus ponderosa* Dougl. on the Judith Mountains has increased noticeably. Note the same fence post by the hood of the cars, although the new road has been moved 100 yards back.



**LOCATION :**

Lewiston, Montana

Twenty six miles northeast of Lewiston, Montana, on dirt road leading to Roy, looking NNE to Black Butte.

**ORIGINAL PICTURE :**

September 23, 1917, Shantz R-5-1917 (top).

**RETAKES :**

June 29, 1959, W.S.P. G-10-1959 (bottom).

**DESCRIPTION :**

The grass in this area has shown remarkable recovery, although there is much *Selaginella densa* Rydb. in the grass. *Opuntia* spp. is very common in this grassland, although Dr. Shantz does not mention it in the original photograph.

See also W.S.P. G-11-1959 from the same position looking toward the Judith Mountains.



**LOCATION:**

Lombard, Montana

Along Missouri River at Lombard railroad station at point where two railroads cross. Road to Lombard through Toston, Montana.

**ORIGINAL PICTURE:**

August 13, 1908, Shantz M-4-1908 (top).

**RETAKE:**

August 5, 1960, W.S.P. A-6-1960 (bottom).

**DESCRIPTION:**

The *Pinus flexilis* James has not changed much from the original photograph, and the shrubs on the opposite side of the river are practically the same. A picture of this type illustrates how slow changes are in this country.

Dr. Shantz took a number of photographs M-1 to M-5, 1908. This is the only photograph that we were able to relocate. Evidently he came by horseback north from Three Forks. This area is now inaccessible to cars.



**LOCATION:**

Moccasin, Montana

The Moccasin Experiment Station, 29 miles west of Lewiston, Montana.

**ORIGINAL PICTURE:**

August 15, 1908, Shantz M-7-1908 (top).

**RETAKE:**

August 7, 1960, W.S.P. B-8-1960 (bottom).

**DESCRIPTION:**

The original picture shows *Arenaria* spp., *Bouteloua* spp., and *Artemisia* spp. Of the two buildings shown in the original photograph, the one on the right is still used as a home. The one on the left is the machine shed which has been torn down. The picture illustrates the rugged early day environment these Experiment Stations had to build from.





**LOCATION:**

Roundup, Montana

Sixteen and six tenths of a mile north of Billings, Montana, north on U. S. Highway 87, dirt road left for one mile. In field about 100 yards from the dirt road is a high rock formation. This set of pictures was taken from the top of this ledge.

**ORIGINAL PICTURE:**

August 10, 1918, Shantz U-6-1918 (top).

**RETAKE:**

August 8, 1960, W.S.P. D-2-1960 (bottom).

**DESCRIPTION:**

Yellow pines in the two pictures show little change, except the increase in size. Number of trees about the same. Dr. Shantz has marked this picture "Type of Divide." The grass is mainly Grama grass with occasional *Andropogon scoparius* Michx. and *Calamovilfa longifolia* (Hook) Scribn.

Dr. Shantz' panoramas in this region U-6 to U-12 and V-1 to V-3, 1918, shows practically 360 degrees of the country. Only two are used in this report.



**LOCATION :**

Roundup, Montana

Sixteen and six tenths of a mile north of Billings, Montana, north on U. S. Highway 87, unpaved road left for one mile. In field about 100 yards from the dirt road is a high rock formation. This set of pictures was taken from the top of this ledge.

**ORIGINAL PICTURE :**

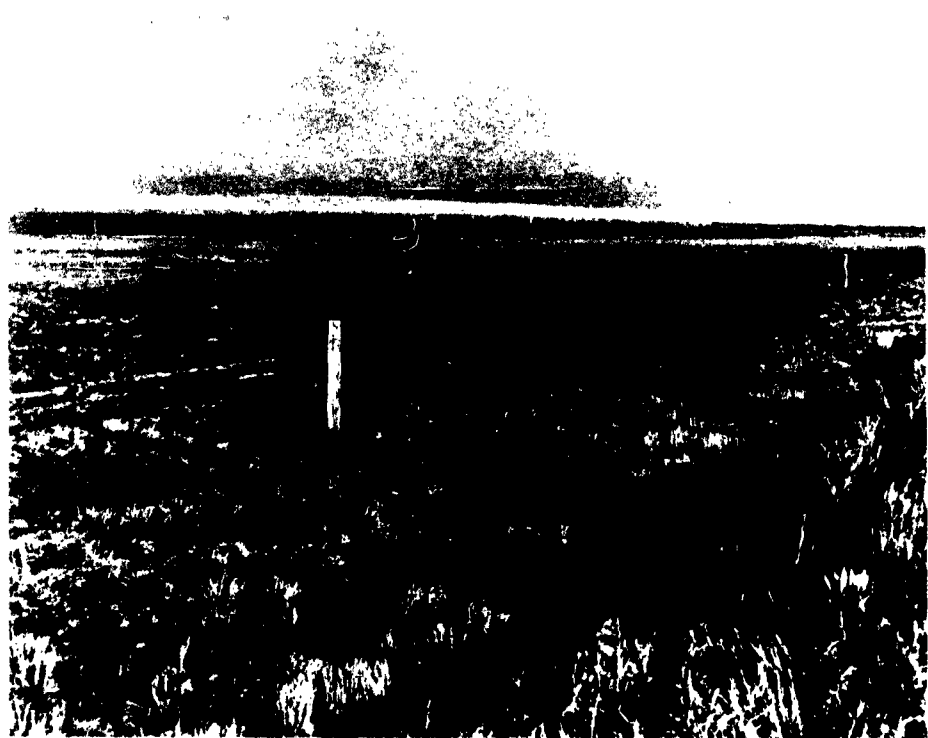
August 10, 1918, Shantz U-11-1918 (top).

**RETAKE :**

June 28, 1959, W.S.P. F-6-1959 (bottom).

**DESCRIPTION :**

This is looking in the opposite direction from the other picture in this panorama (U-6). It shows the development of the tree vegetation. A few more trees are evident. There were some cultivated areas in the middle background near the end of the road which have been abandoned and are now regressed. The over-all picture shows the general development of the forest.



**LOCATION:**

Townsend, Montana

Seven and two tenths of a mile north of Townsend, position approximate. New road graded too high to photograph over. New reservoir along Missouri River.

**ORIGINAL PICTURE:**

September 7, 1925, Shantz T-11-1925 (top).

**RETAKE:**

July 2, 1959, W.S.P. H-12-1959 (bottom).

**DESCRIPTION:**

*Bouteloua gracilis* (H.B.K.) Lag. shows in flower in the original picture. Retake shows same *Bouteloua* plus Russian Thistle and *Artemisia* spp.



**LOCATION :**

Townsend, Montana

Twelve and eight tenths of a mile south of Townsend, or thirteen and three tenths of a mile north of Three Forks, Montana. One half mile west of U. S. Highway 10 in field where old road is still visible. Looking NNW.

**ORIGINAL PICTURE :**

September 8, 1925, Shantz U-4-1925 (top).

**RETAKE :**

July 2, 1959, W.S.P. H-10-1959 (bottom).

**DESCRIPTION :**

The original picture shows a grassland composed mainly of *Stipa* spp. and wheat grass. In the retake the stubble is wheat. Russian Thistle is common along the edge of field.





**LOCATION :**

Valentine, Montana

Near Valentine looking ENE from Pine Bluff overlooking range one half mile from rock near road to Dovetail.

**ORIGINAL PICTURE :**

August 9, 1918, Shantz T-3-1918 (top).

**RETAKE :**

June 29, 1959, W.S.P. G-7-1959 (bottom).

**DESCRIPTION :**

The original grass is *Bouteloua gracilis* (H.B.K.) Lag. and *Agropyron smithii* Rydb. Some small amount of *Artemisia* spp. in low areas. In the retake the grasses seem about the same but *Artemisia* spp. has spread considerably and *Opuntia* spp. is common in the grass. *Pinus ponderosa* Dougl. on the bluffs has about the same number of trees, but they are larger. The stump of the farthest tree to the left is still present, although the tree has been cut down.



**LOCATION:**

Valentine, Montana

From the top of the bluff shown in T-3-1918 looking northeast down the valley from Valentine, Montana.

**ORIGINAL PICTURE:**

August 9, 1918, Shantz T-5-1918 (top).

**RETAKES:**

June 29, 1959, W.S.P. G-9-1959 (bottom).

**DESCRIPTION:**

Grasses of *Agropyron smithii* Rydb. and some *Stipa* spp. still present. *Pinus ponderosa* Dougl. shows some increase in size of individual trees and some reproduction. Original snag in middle foreground still present.



**LOCATION:**

Crawford, Nebraska

Town stadium and park is immediately in back of this picture point.

**ORIGINAL PICTURE:**

October 19, 1909, Shantz W-6-1909 (top).

**RETAKE:**

August 12, 1960, W.S.P. E-12-1960 (No. 2390) (bottom).

**DESCRIPTION:**

The vegetation is mainly *Bouteloua gracilis* (H.B.K.) Lag. and *Bouteloua hirsuta* Lag., *Carex filifolia* Nutt. amounts to almost one half of the ground cover in many places. *Stipa comata* Trin. and Rupr. and *Artemisia filifolia* Torr. account for most of the other growth. A few plants of *Liatris punctata* Hook and *Psoralea tenuiflora* Pursh are present. In many places *Calamovilfa longifolia* (Hook) Scribn. is predominant. On the hills in the background are trees of *Pinus ponderosa* Dougl. No particular change in the ecotone between grasses and pines.



**LOCATION:**

Crawford, Nebraska

Fourteen and seven tenths of a mile north of Crawford on Star Route 2 near railroad siding where road to Toadstool Park takes off. Original Shantz negative was labeled south of Edgemont, S. D. on Burlington railroad.

**ORIGINAL PICTURE:**

August 18, 1910, Shantz T-2-1910 (top).

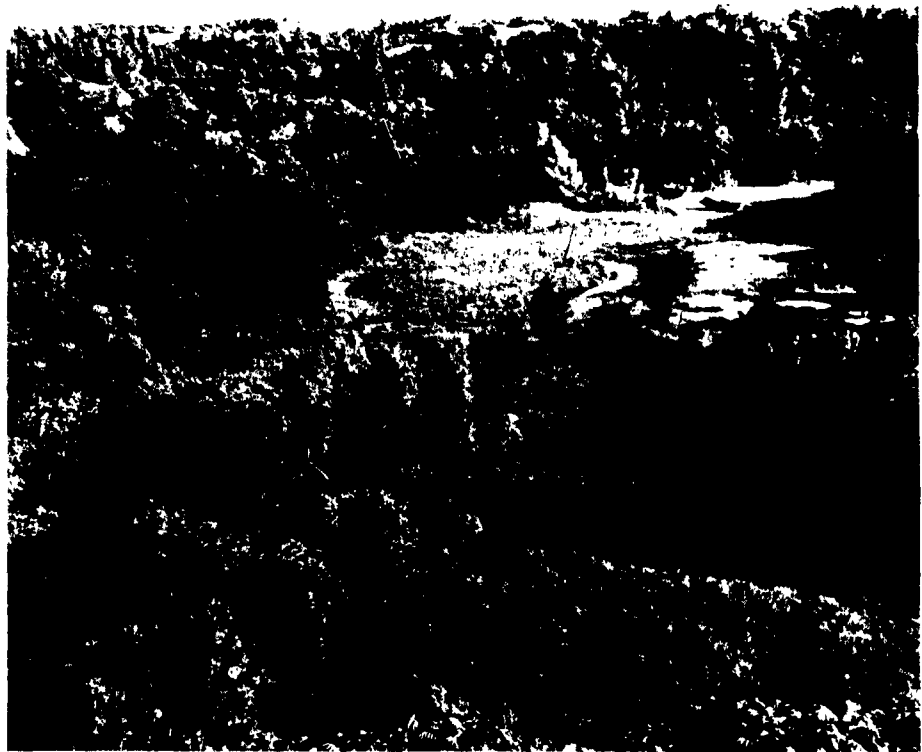
**RETAKE:**

August 11, 1960, W.S.P. E-11-1960 (No. 2389) (bottom).

**DESCRIPTION:**

These are some of the so-called Nebraska Badlands. The original picture was evidently taken while the train was on the siding. Erosion is about the same. The grass is mainly *Bouteloua* spp. The foreground shows some recovery in the later picture. Original gullies not much increased.





**LOCATION :**

Long Pine, Nebraska

East end of the railroad bridge one mile west of the railroad station over Long Pine Creek.

**ORIGINAL PICTURE :**

October 21, 1909, Shantz X-9-1909 (top).

**RETAKES :**

June 17, 1958, W.S.P. C-12-1958 (bottom), also D-1-1958.

**DESCRIPTION :**

This is an excellent location for western extension of eastern trees. The trees here are various species of *Quercus*, *Ulmus*, *Salix*, *Populus* and *Acer negundo* L. The shrub in the foreground is *Rhus glabra* L. mixed in with this are *Pinus ponderosa* Dougl. and *Juniperus* spp.

The creek bed in this photograph has changed considerably. Some of the same trees in the old photograph can be picked out in the new photograph. The vegetation seems much denser in the new picture, but this may be due to the fact that the old picture was taken in October when the deciduous trees had shed some of their leaves.



**LOCATION :**

Sydney, Nebraska

This was taken from a hill on which a standpipe for city water supply is located. The foreground in the original picture has been bulldozed to make a level area surrounding standpipe.

**ORIGINAL PICTURE :**

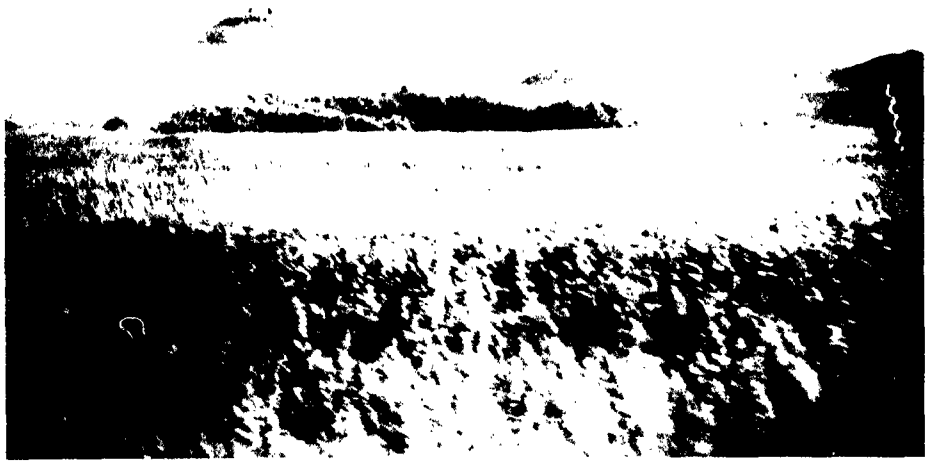
July 14, 1908, Shantz E-3-1908 (top).

**RETAKE :**

June 13, 1958, W.S.P. A-8-1958 (bottom).

**DESCRIPTION :**

Two pictures of this area were from the same location, but only one is used in this report. It is typical of what has happened to early western towns. The picture taken in 1908 shows very few trees and a pioneering type of construction, whereas the retake in 1958 shows a dense covering of mainly street plantings. The trees are mainly American Elm and Box Elder.



**LOCATION:**

Fort Lincoln, North Dakota

West of paved road to Fort Lincoln. Tavern at the foot of the hill on the right side of the picture east of railroad. Two miles north of Fort Lincoln State Park headquarters.

**ORIGINAL PICTURE:**

July 16, 1915, Shantz R-7-1915 (top).

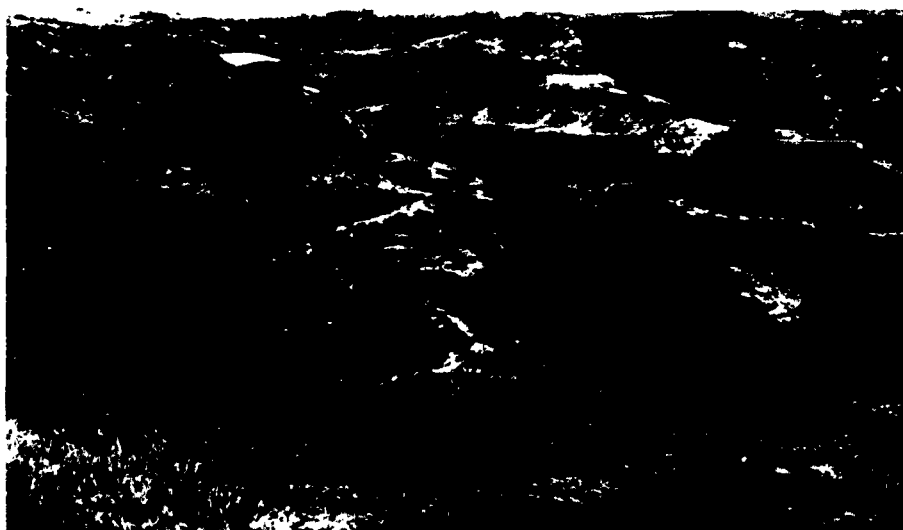
**RETAKE:**

June 24, 1959, W.S.P. D-10-1959 (bottom).

**DESCRIPTION:**

Trees mostly Cottonwood along water course. Shrubs under crest of high hill are *Shepherdia canadensis* (L.) Nutt. Cultivation just starting at the foot of the hills on right side of picture now completely cultivated with potatoes. The block house in Fort Lincoln Park shows in the notch between the ledge on the left and the one immediately to the right.

See also W.S.P. D-9-1959, another photograph in Fort Lincoln State Park showing cultivated fields along Missouri River.



**LOCATION:**

Fryberg, North Dakota

Badlands between Fryberg and Medora on dirt road south of U. S. 10, near power company equipment station. This location is approximately one mile west of the other Fryberg locations.

**ORIGINAL PICTURE:**

September 22, 1924, Shantz H<sup>2</sup>-2-1924 (top).

**RETAKE:**

June 26, 1959, W.S.P. E-10-1959 (bottom).

**DESCRIPTION:**

This is the left hand end of the panorama and shows the erosion bank. The shrubs in the foreground mainly *Symphoricarpos* spp. and shrubby Cinquefoil. The grasses are mainly *Stipa comata* Trin. and Rupr., with some *Bouteloua* spp. The "peaks" on the horizon of old picture are haystacks.





**LOCATION :**

Fryburg, North Dakota

Badlands between Fryburg and Medora on dirt road south of U. S. 10, near power company equipment station. This location is approximately one mile west of the other Fryburg locations.

**ORIGINAL PICTURE :**

September 22, 1924, Shantz H<sup>2</sup>-4-1924 (top).

**RETAKE :**

June 26, 1959, W.S.P. E-12-1959 (bottom).

**DESCRIPTION :**

Very little change in this. The trees mainly pines on the hill in the center are approximately the same. Two dirt tanks have been built in the background to the right. Erosion has not changed much. Dr. Shantz took a panorama from this point which I rephotographed. They are W.S.P. E-6- to E-12, 1959.



**LOCATION :**

Fryburg, North Dakota

Twenty nine miles west of Dickinson on old road one mile south of U. S. 10. Ten miles southwest of Fryburg looking NNE.

**ORIGINAL PICTURE :**

September 22, 1924, Shantz G<sup>2</sup>-8-1924 (top).

**RETAKES :**

June 25, 1959, W.S.P. E-4-1959 (bottom).

**DESCRIPTION :**

Dr. Shantz had taken a series of about ten pictures in this area within a distance of about fifty feet. The area is a dry water course with some watering holes for cattle. The grasses here are *Stipa comata* Trin. and Rupr. and *Bouteloua gracilis* (H.B.K.) Lag. with some *Andropogon scoparius* Michx. The shrubs are mainly *Shepherdia canadensis* (L.) Nutt. and *Symphoricarpos* spp. In the new picture the tree growth has increased. The large tree in the center is *Fraxinus* spp., and the shrubs are the same as the original picture except for *Prunus* spp. which Dr. Shantz does not mention. The Microwave Station was in the middle distance.

See also W.S.P. D-11 and D-12, 1959 and E-1 to E-5, 1959.



**LOCATION:**

Fryburg, North Dakota

Twenty nine miles west of Dickinson on old road one mile south of U. S. 10. Ten miles southwest of Fryburg looking NNE. This is the picture that gives us the exact location by the rock that sticks up top center of the picture.

**ORIGINAL PICTURE:**

September 22, 1924, Shantz G<sup>2</sup>-12-1924 (top).

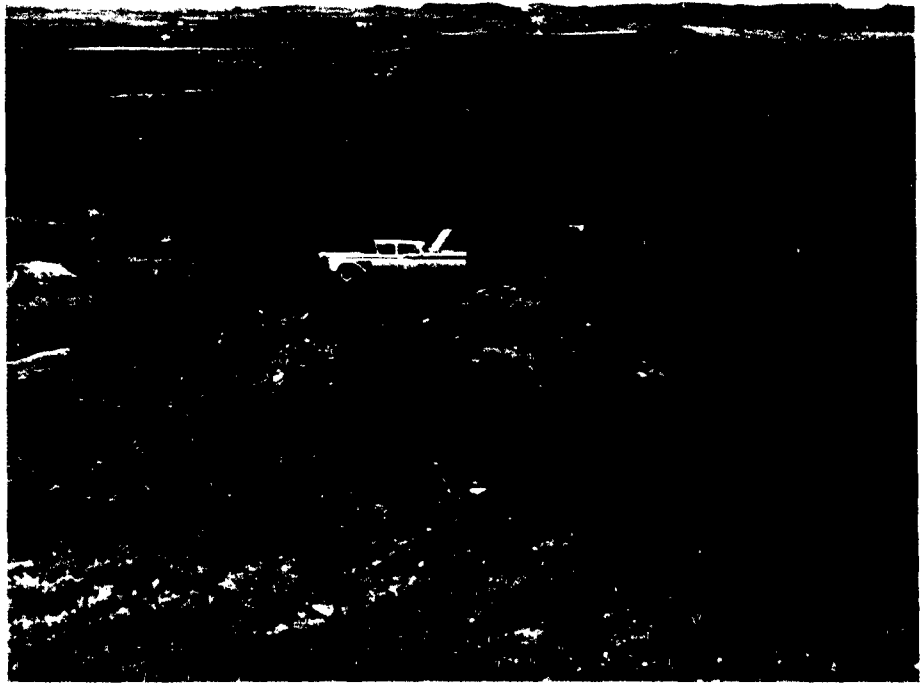
**RETAKE:**

June 25, 1959, W.S.P. E-5-1959 (bottom).

**DESCRIPTION:**

This shows the recovery of an eroded stream bank. The shrubs are mainly *Fraxinus* spp. and *Prunus*.

See also W.S.P. D-11 and D-12, 1959, and E-1 to E-5, 1959. Dr. Shantz took a series of about ten pictures within 50 feet of the same location.



**LOCATION:**

Hettinger, North Dakota

On U. S. 12 south of the town looking northeast on Fletcher's Hill with T.V. antenna.

**ORIGINAL PICTURE:**

August 3, 1908, Shantz H-9-1908 (top).

**RETAKES:**

June 25, 1959, W.S.P. F-2-1959 (bottom).

**DESCRIPTION:**

Between this point and town, a dam has been built and an artificial lake created. The original cultivation was oats and flax. Modern cultivation is forage grasses.





**LOCATION:**

Mandan, North Dakota  
From hill south of Experiment Station looking north.

**ORIGINAL PICTURE:**

July 15, 1915, Shantz R-3-1915 (top).

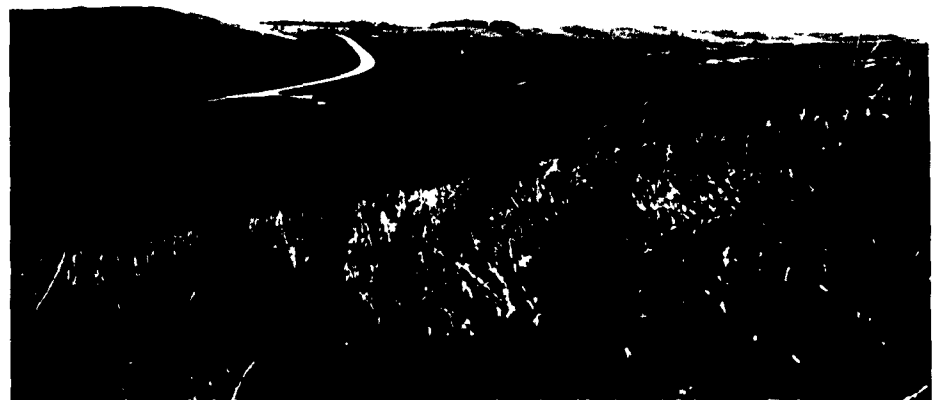
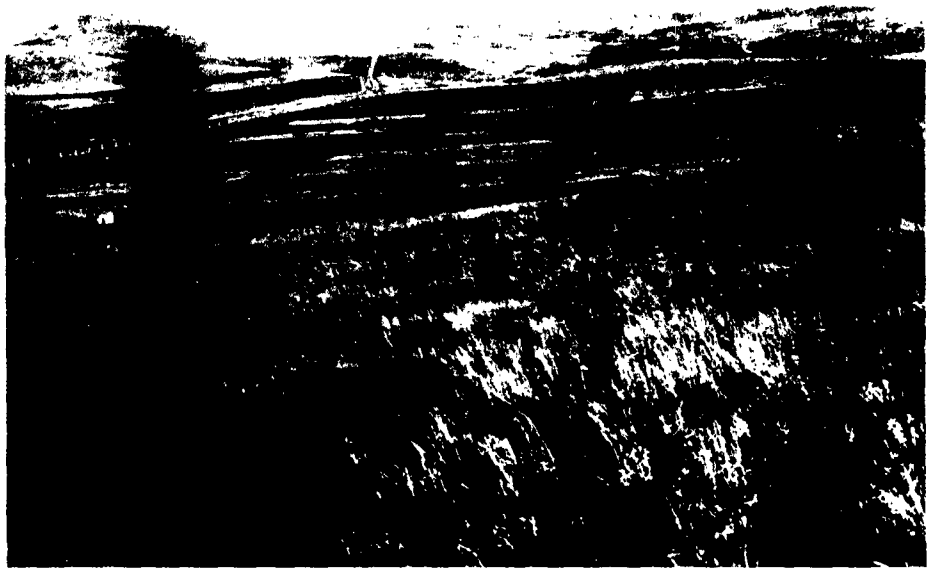
**RETAKE:**

July 15, 1959, W.S.P. No. 2156 (bottom).

**DESCRIPTION:**

The original of this picture was taken soon after the Experiment Station was opened and the planting of trees has increased.

See also W.S.P. Nos. 2156 to 2164. It was raining the day we were here and George Rogler of the Field Station took these pictures for us later.



**LOCATION:**

Mandan, North Dakota  
From hill south of Experiment Station looking north.

**ORIGINAL PICTURE:**

July 15, 1915, Shantz R-5-1915 (top).

**RETAKE:**

July 15, 1959, W.S.P. No. 2159 (bottom).

**DESCRIPTION:**

This was taken from the top of the same hill looking south, with the field plots of the original station showing.

The grasses in the foreground are *Stipa spp.* and *Andropogon scoparius* Michx. The same grasses appear in the retake. The cultivated fields have been abandoned.



**LOCATION:**

Arpan, South Dakota

On section road one mile south of old Kennedy School by irrigation canal. Go north from Arpan's store nine tenths of a mile, turn east two miles to north-south road on which corner the Kennedy school stands.

**ORIGINAL PICTURE:**

July 18, 1908, Shantz No. 29, 1908 (top).

**RETAKE:**

August 10, 1960, W.S.P. D-8, 1960 (bottom).

**DESCRIPTION:**

Dr. Shantz' trip to this area had to do with a new irrigation project just being developed. The original picture shows the land as it was before irrigation, with an alkali spot in the foreground. The retake of this photograph is nearly exact. Bear Butte is very faintly discernible in both pictures. The small knoll at the left in front of Bear Butte is left of the trees on the horizon. This country is completely irrigated now and the original vegetation is hard to find. Corn, sugar beets and alfalfa are the chief crops now.



**LOCATION:**

Belle Fourche, South Dakota

Located along U. S. Route 85, fourteen and two tenths of a mile north of town. The new road is 50 yards east of the old road which is still visible.

**ORIGINAL PICTURE:**

July 19, 1927, Shantz V-10-1927 (top).

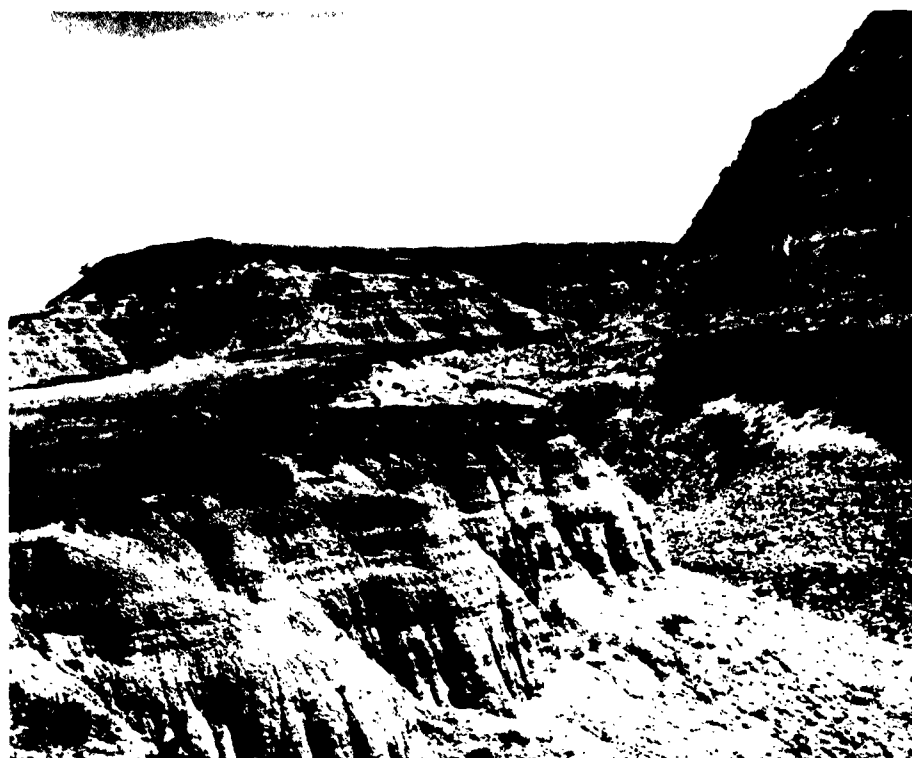
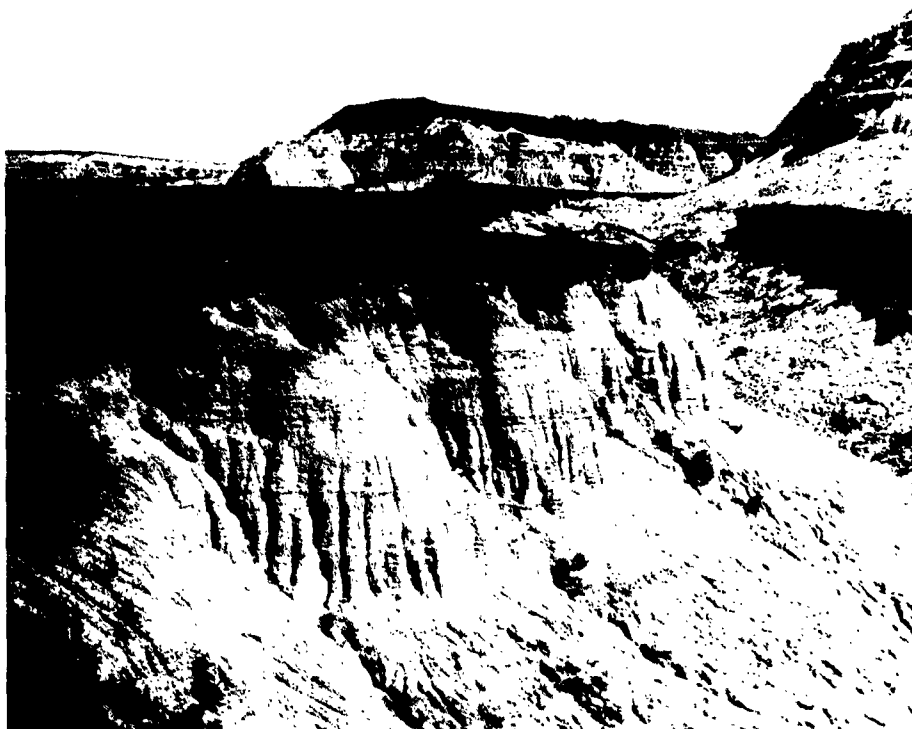
**RETAKES:**

June 19, 1959, W.S.P. B-6-1959 (bottom), (Also No. 2080).

**DESCRIPTION:**

These two photographs illustrate how little change can occur over a long period of time in some of the more arid sites. The main plant is *Atriplex nuttallii* S. Wats. A small amount of grass visible in the mid picture is one of the wheat grasses (*Agropyron smithii* Rydb.) and shows in both photographs.





**LOCATION:**

Belvidere, South Dakota  
Seventeen miles south of Belvedere on State Route 40 along Black Pipe Creek.

**ORIGINAL PICTURE:**

July 3, 1927, Shantz P-12-1927 (top).

**RETAKE:**

June 16, 1958, W.S.P. C-5-1958 (bottom).

**DESCRIPTION:**

This picture and others from the same region illustrates minimal erosion effects. The cliffs were little changed and even the same ridges can be seen in both photographs. Probably the erosion is extremely slow and apt to be catastrophic. The sod of short grass plants holds the surface firmly in place.

Notice along the top of erosion bank colonies of *Opuntia* spp., an indication that this plant comes into unoccupied grass areas.

See also Shantz' photographs: P-5-1927; P-9-1927; P-10-1927; P-11-1927.



**LOCATION:**

Belvidere, South Dakota  
Seventeen miles south of Belvidere on State Route 40 along Black Pipe Creek.

**ORIGINAL PICTURE:**

July 3, 1927, Shantz P-10-1927 (top).

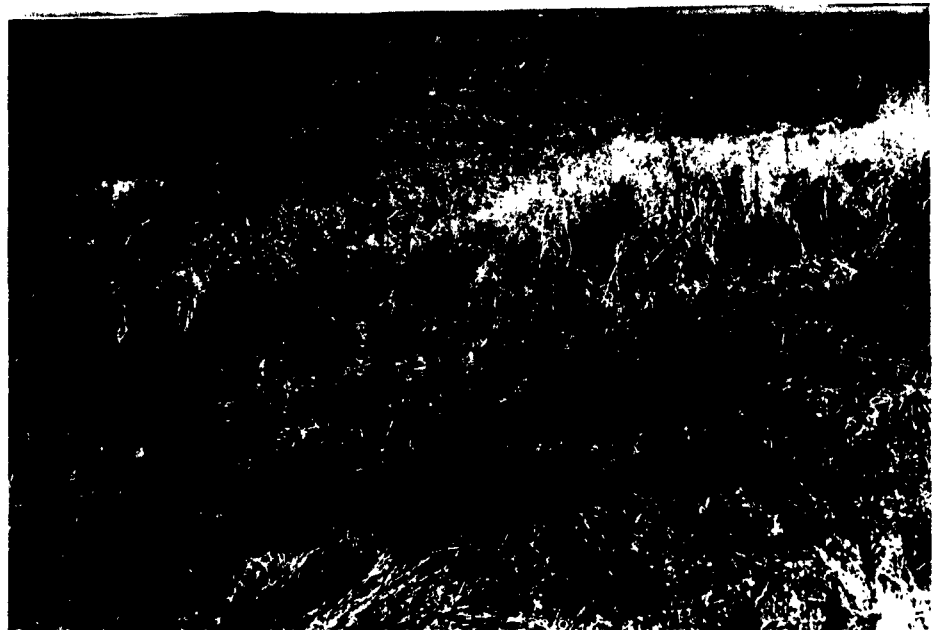
**RETAKES:**

June 16, 1958, W.S.P. C-6-1958 (bottom).

**DESCRIPTION:**

This is a typical area of short grass plains. There has been very little change over the period of the two pictures and the same grasses are present in both pictures. The main plants are *Bouteloua* spp., *Stipa comata*, Trin. and Rupr. and *Aristida* spp.

See also Shantz' photographs: P-5-1927; P-9-1927; P-11-1927; P-12-1927.



**LOCATION:**

Blunt, South Dakota

Approximately five miles west of Blunt along U. S. 14 looking ESE. The position is only approximate. The Medicine Knolls are on the left side of the horizon.

**ORIGINAL PICTURE:**

June 27, 1927, Shantz K-7-1927 (top).

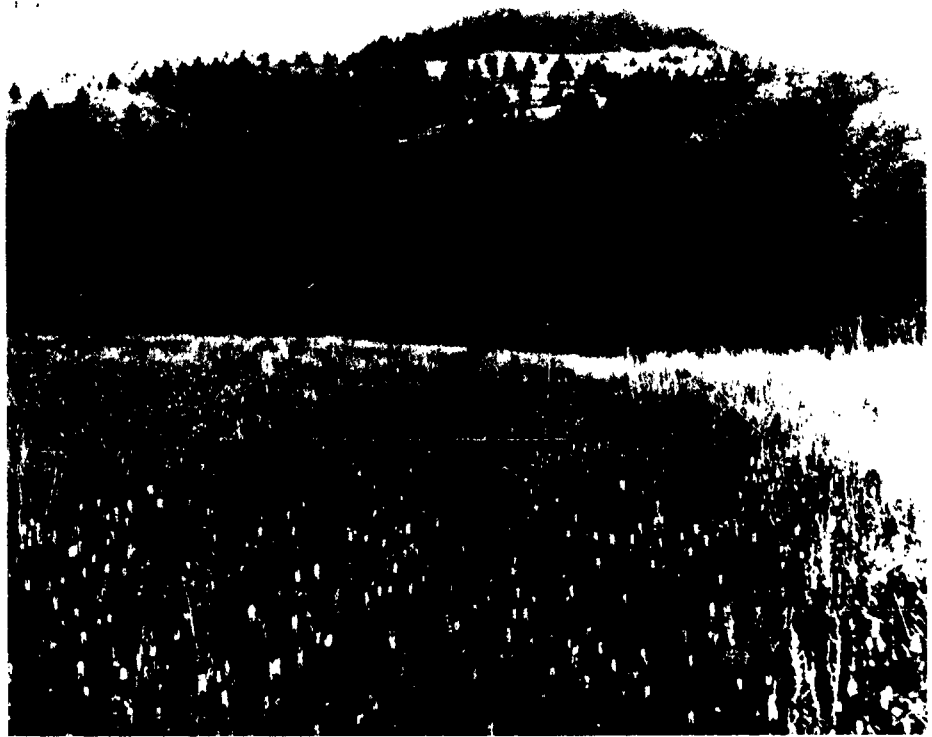
**RETAKE:**

June 22, 1959, W.S.P. D-3-1959 (bottom).

**DESCRIPTION:**

The vegetation of the original photograph consists of showy flowers of the *Penstemon* spp. and various grasses of *Bouteloua gracilis* (H.B.K.) Lag., *Stipa comata* Trin. and Rupr., *Koeleria cristata* (L.) Pers. and *Stipa* spp. These same grasses are still present along roadsides, although the main area has been under cultivation. There were only scattered plants of the *Penstemon* along the roadside.

See also Shantz K-6-1927.



**LOCATION:**

Custer Park, South Dakota  
Two miles south of Game Lodge.

**ORIGINAL PICTURE:**

July 15, 1927, Shantz X-10-1927 (top).

**RETAKE:**

June 30, 1958, W.S.P. D-8-1958 (bottom).

**DESCRIPTION:**

Forest mainly of Ponderosa pines shows remarkable recovery. *Agropyron smithii* Rydb. is still the dominant plant in both pictures, however, the 1927 photograph shows much *Psoralea tenuiflora* Pursh. This plant was rare when the photograph was retaken and found only along the roadside. *Melilotus officinalis* (L.) Lam. and *Bromus tectorum* L. were common throughout this area, although they are not mentioned in Dr. Shantz' original notes. The shrubs under the trees are *Rosa* spp.

See also Shantz' photograph X-9-1927, same area to the right of picture described above.





**LOCATION:**

Deadwood, South Dakota  
North of Deadwood on U. S. 85 to Spearfish just after you leave U. S. Alternate 14.

**ORIGINAL PICTURE:**

July 17, 1927, Shantz Y-6-1927 (top).

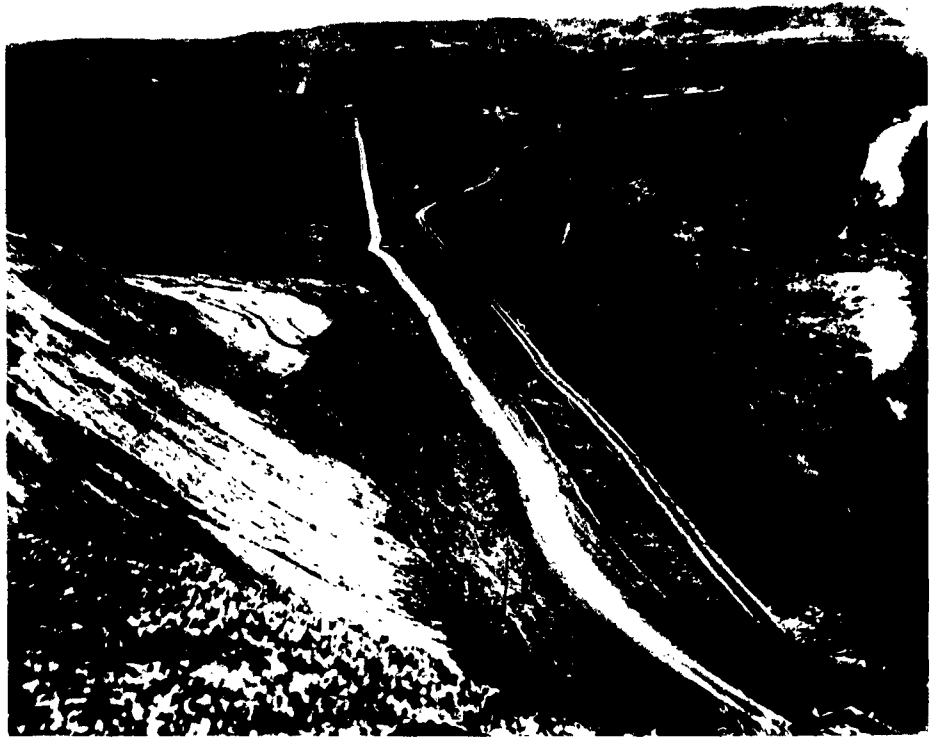
**RETAKES:**

June 22, 1958, W.S.P. E-10-1958 (bottom).

**DESCRIPTION:**

Picture shows a fair increase in the number of *Ponderosa* pines on the hillside. Probably much of this regrowth is the result of forest being allowed to recover without excessive cutting.

See also Shantz Y-5-1927, shows some recovery from burn.



**LOCATION:**

Fort Pierre, South Dakota  
On U. S. Highway 83 just outside of town.

**ORIGINAL PICTURE:**

July 22, 1908, Shantz 38-1908 (top).

**RETAKES:**

June 19, 1958, W.S.P. D-4 and D-5, 1958 (bottom).

**DESCRIPTION:**

Most of the hill from which this picture was taken in 1908 has been removed to make way for a modern highway. The camera point is probably about 25 feet above where the retake was made. This picture shows a long road building history. In the old picture there are two wagon roads shown. In the new photograph you can see not only the new highway, but at least two scars of older roads not in the 1908 picture. The green cover in the new photograph is entirely *Kochia scoparia* (L.) Schrad., a plant not present in 1908. There are also a few stems of *Melilotus officinalis* (L.) Lam., another new weed. Trees along the Bad River at the right of the pictures are about the same.

See also Shantz' photograph G-3-1908. Another picture from the Fort Pierre area showing recovery of an old brick yard.



**LOCATION:**

Gregory, South Dakota  
Five miles south of the town on county road.

**ORIGINAL PICTURE:**

June 30, 1927, Shantz L-12-1927 (top).

**RETAKE:**

June 18, 1958, W.S.P. D-3, 1958 (bottom).

**DESCRIPTION:**

A reservoir with an earthen dam was created in the area where there was only a single tree in 1927. The grass cover in the original picture is in much better condition and consisted of *Bouteloua gracilis* (H.B.K.) Lag. and *Agropyron smithii* Rydb. with some *Buchloe dactyloides* (Nutt.) Engelm. One of the weeds apparent in the older picture is *Rosa* spp. In the later picture the grass is typically overgrazed, probably due to the nearness of water tank. *Bromus tectorum* L. is very abundant and cattle spit out bunches of half-chewed plants. *Melilotus officinalis* (L.) Lam. is becoming well-established, especially in disturbed areas.

There are several other pictures from this particular area which were not relocated.



**LOCATION:**

Highmore, South Dakota

Two hundred yards northwest of section road. Eight tenths of a mile southwest of Highmore water tower.

**ORIGINAL PICTURE:**

July 23, 1908, Shantz G-4-1908 (top).

**RETAKE:**

June 22, 1959, W.S.P. No. 2097 (bottom).

**DESCRIPTION:**

The weedy vegetation shown in the 1908 picture was merely marked "native grass." When rephotographed in 1959 an excellent stand of wheat grass was present.





**LOCATION:**

Highmore, South Dakota

Two hundred yards northwest of section road. Eight tenths of a mile southwest of Highmore water tower.

**ORIGINAL PICTURE:**

July 23, 1908, Shantz G-5-1908 (top.)

**RETAKE:**

June 22, 1959, W.S.P. D-5-1959 (bottom).

**DESCRIPTION:**

The old road has been long abandoned. The old tracks are still visible and the notch in the skyline where the road used to be is still evident. The original picture shows *Hordeum jubatum* L., a common weed in disturbed areas. There was very little *Hordeum jubatum* L. in the retake. The area rephotographed in 1959 had been planted to wheat grass and there was a fair stand growing.

In the 51 years since this picture was taken the country has changed little aside from local man-made disturbances.



**LOCATION:**

Hotsprings, South Dakota

From Signal Hill looking toward the Seven Sister's Range. The local law enforcement radio antenna is located on this hill. Mr. W. P. Richie of the County Court House was helpful in establishing this location.

**ORIGINAL PICTURE:**

August 7, 1914, Shantz P-3-1914 (top).

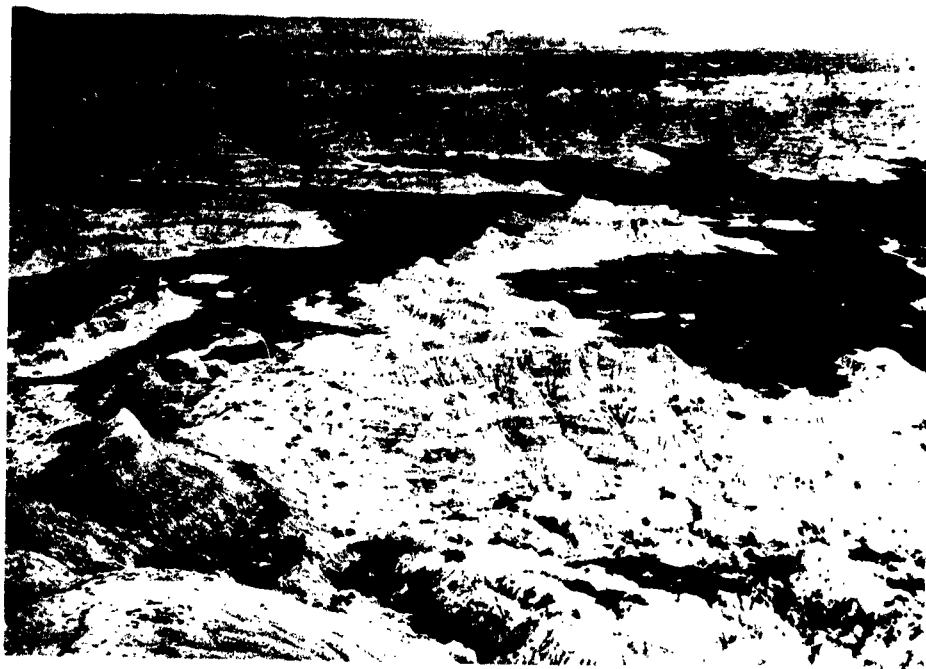
**RETAKE:**

June 21, 1958, W.S.P. E-1-1958 (bottom).

**DESCRIPTION:**

The three houses most evident in the original picture are still standing, but the town has grown considerably and much tree planting has taken place. The stand of *Pinus ponderosa* Dougl. has considerably thickened and almost covered the Seven Sister's range in the background. On the hill from which this picture was taken the following plants are present and have not changed much since the original except for the lack of grazing which has allowed the present day vegetation to thicken: *Yucca glauca* Nutt., *Stipa comata* Trin. and Rupr., *Gutierrezia sarothrae* (Pursh) Britt. & Rusby, *Bouteloua gracilis* (H.B.K.) Lag., *Aristida longiseta* Steud., *Artemisia gnaphalodes* Nutt., *Tetaneuris* spp., *Carex filifolia* Nutt., *Chrysopsis villosa* (Pursh) Nutt. and *Andropogon scoparius* Michx. In general the grass on the mountain front is *Bouteloua gracilis* (H.B.K.) Lag.

This picture is part of a panorama of three matching pictures. The other pictures are: Shantz P-4-1914 and P-1-1914.



**LOCATION:**

Kadoka, South Dakota

Thirteen miles south of Kadoka at so-called Kodak Point. An old picnic area now closed by a wire gate.

**ORIGINAL PICTURE:**

July 3, 1927, Shantz Q-7-1927 (top).

**RETAKE:**

June 16, 1958, W.S.P. B-8-1958 (bottom).

**DESCRIPTION:**

There is remarkably little change in these Dakota Badlands. The same individual plants can be picked out in the old and new photographs with very little change. The hills in the background have *Juniperus* spp. with Buffalo Berry.

See also Q-3-1927, Q-4-1927, Q-5-1927 and Q-6-1927, other pictures taken at the same point as a panorama.



**LOCATION:**

Kadoka, South Dakota

Thirteen miles south of Kadoka at so-called Kodak Point. An old picnic area now closed by a wire gate.

**ORIGINAL PICTURE:**

July 3, 1927, Shantz Q-4-1927 (top).

**RETAKE:**

June 16, 1958, W.S.P. B-11-1958 (bottom).

**DESCRIPTION:**

This picture shows a rather remarkable plateau of Grama grass within Badlands. Grazing is limited on this plateau because of the rough topography. The grass has held up well and is holding erosion on this particular area.





**LOCATION:**

Kadoka, South Dakota

Near Kodak Point along the main highway where highway drops into bottom of the Badlands.

**ORIGINAL PICTURE:**

July 3, 1927, Shantz, Q-10-1927 (top).

**RETAKES:**

June 16, 1958, W.S.P. B-6-1958 (bottom).

**DESCRIPTION:**

A rather good piece of grassland that is holding the erosion. This area of grassland (*Bouteloua* spp. and some *Juniperus* spp.) has eroded little in the 31 years between the photographs.



**LOCATION:**

Newell, South Dakota

Photograph position in Alex Meyer's pasture, four miles northeast of Newell. Large rock on hill easily seen for some distance. This location some distance from main highway and two local men, Wesley and Harold Nelson took us to the position through several fields.

**ORIGINAL PICTURE:**

June 29, 1913, Shantz M-2-1913 (top).

**RETAKE:**

June 19, 1959, W.S.P. No. 2079 (bottom).

**DESCRIPTION:**

Dr. Shantz took a 180° panorama from this point and made a rather complete list of the species present at this rock. The main grasses are *Agropyron* spp. and *Stipa viridula* Trin. In addition Dr. Shantz listed the following plants as growing in this area: *Agropyron* spp.; *Stipa viridula* Trin.; *Cirsium plattense* (Rydb.) Fernald; *Grindelia squarrosa* (Pursh) Dunal; *Phlox* sp.; *Vicia americana* Muhl. ex Willd.; *Iva axillaris* Pursh; *Aster* spp.; *Lesquerella* spp.; *Erysium asperum* (Nutt.) DC.; *Comandra pallida* A. DC.; *Opuntia polyacantha* Haw.; *Bahia oppositifolia* (Nutt.) Rydb.; *Helianthus* spp.; *Atriplex canescens* (Pursh) Nutt.; *Allium reticulatum* Fraser; and *Plantago purshii* Roem. & Schult.

In the pictures of this area the most noticeable changes between the old and the new is the increase in the amount of Prickly Pear in the new pictures.

The panorama includes Shantz' M-4 to M-10, 1913.



**LOCATION:**

Newell, South Dakota

Photograph position in Alex Meyer's pasture, four miles northeast of Newell. Large rock on hill easily seen for some distance. This location some distance from main highway and two local men, Wesley and Harold Nelson took us to the position through several fields.

**ORIGINAL PICTURE:**

June 29, 1913, Shantz M-4-1913 (Top).

**RETAKES:**

June 19, 1959, W.S.P. B-5-1959 (bottom).

**DESCRIPTION:**

This is one of the series of panoramic pictures Dr. Shantz took from this point. The alkali areas showing in the original photograph are almost entirely gone. Grasses (*Agropyron* spp. and *Stipa viridula* Trin.) seem to be about the same.



**LOCATION:**

Pine Ridge, South Dakota

Pine Ridge is almost on the Nebraska-South Dakota line, one mile south of U. S. Highway 18 , on Pine Ridge Indian Reservation.

**ORIGINAL PICTURE:**

July 4, 1927, Shantz S-1-1927 (top).

**RETAKE:**

June 14, 1958, W.S.P. A-12-1958 (bottom).

**DESCRIPTION:**

Dr. Shantz was here in 1927 on July 4, when the Indians had a special celebration. You can see the temporary encampment in the original pictures. The main change has been the river bottom. One of the "old timer's" at the store said that there was at one time a dam across this valley that backed the water up. This dam washed out and since that time many trees have come in. The grass-land vegetation was mainly *Bouteloua gracilis* (H.B.K.) Lag., and *Stipa comata* Trin. and Rupr. The new photograph shows much *Melilotus officinalis* (L.) Lam. which was not present in the original. *Bromus tectorum* L. is omnipresent in the new photograph.

See also photographs S-2, S-4 and S-6, 1927.





**LOCATION:**

Redfield, South Dakota

At the Junction of U. S. Highways 212 and 281 the houses are now on First Street East.

**ORIGINAL PICTURE:**

July 30, 1908, Shantz H-1-1908 (top).

**RETAKE:**

June 22, 1959, W.S.P. D-7-1959 (bottom).

**DESCRIPTION:**

The four houses in the original picture are still standing. However, the original picture was taken further back. At the present time a grain elevator cuts off this location. The railroad was built through this area at about the time the first picture was taken. These were some of the first houses in Redfield. This again illustrates the original plain being barren of trees and with the introduction of civilization a quick planting to give shade. The town now is a well established typical western urban area.



**LOCATION:**

Rosebud, South Dakota

Rosebud on the Rosebud Indian Reservation south of U. S. Highway 18. The area is spoken of as the Fair Grounds.

**ORIGINAL PICTURE:**

July 3, 1927, Shantz O-8-1927 (top).

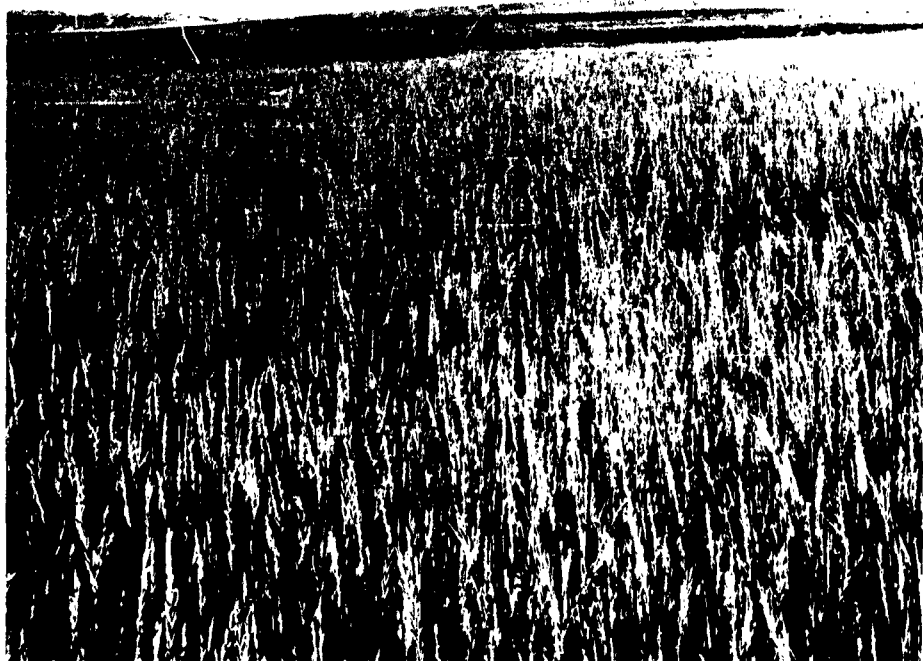
**RETAKE:**

June 17, 1958, W.S.P. C-11-1958 (bottom).

**DESCRIPTION:**

The original vegetation in this area is listed by Dr. Shantz as follows: *Bouteloua gracilis* (H.B.K.) Lag.; *Stipa comata* Trin. and Rupr.; *Koeleria cristata* (L.) Pers.; *Carex filifolia* Nutt.; *Amorpha canescens* Pursh; *Solidago missouriensis* Nutt; *Rosa* spp.; *Asclepias arenaria* Torr.; *Lithospermum* spp.; and *Chrysopsis villosa* (Pursh) Nutt.

In the new picture we were able to pick out the following plants, some of which were not present in the original photographs: *Andropogon hallii* Hack.; *Calamovilfa longifolia* (Hood) Scribn.; *Stipa comata* Trin. and Rupr.; *Koeleria cristata* (L.) Pers.; *Prunus besseyi* Bailey; *Rosa* spp.; *Amorpha canescens* Pursh; *Yucca glauca* Nutt.; and *Aristida longiseta* Steud.



**LOCATION:**

Rumford, South Dakota

Near railroad station along railroad at Rumford, approximately eight miles north of Ardmore on County Road 52.

**ORIGINAL PICTURE:**

July 6, 1927, Shantz V-3-1927 (top).

**RETAKE:**

August 11, 1960, W.S.P. E-8-1960 (bottom.)

**DESCRIPTION:**

Dr. Shantz' original picture shows an almost pure stand of *Agropyron smithii* Rydb. When the 1960 picture was taken there was very little of this grass, there being mainly *Koeleria cristata* (L.) Pers.



**LOCATION:**

Spearfish, South Dakota

Six and four tenths of a mile north of Spearfish on U. S. Road 85. Redwater River Valley one mile south of the bridge. The top of this hill from which the original picture was taken is now a gravel pit. The position is probably 50 feet from the original location.

**ORIGINAL PICTURE:**

August 10, 1914, Shantz R-8-1914 (top).

**RETAKE:**

June 20, 1959, W.S.P. No. 2085 (bottom.)

**DESCRIPTION:**

This is a series of three panoramic pictures taken at this point. The original description shows the following species present: *Stipa comata* Trin. and Rupr.; *Artemisia frigida* Willd.; *Gutierrezia sarothrae* (Pursh) Britt & Rusby; *Paronchia jamesii* T. & G.; *Carex filifolia* Nutt.; *Artemisia canadensis* Michx.; *Chrysopsis villosa* (Pursh.) Nutt.; and *Artemisia gnaphalodes* Nutt.





**LOCATION:**

Spearfish, South Dakota

Two miles north of Spearfish at the Junction U. S. 14 with U. S. 85. Picture was taken near public utility house on hills east of U. S. 85.

**ORIGINAL PICTURE:**

August 10, 1914, Shantz R-12-1914 (top).

**RETAKE:**

June 20, 1959, W.S.P. B-9-1959 (bottom).

**DESCRIPTION:**

The river valley is showing an increase in tree numbers. One tree of Box Elder is filling in the erosion gully in almost the exact center of the photograph. The background of the picture shows good grass because of restricted grazing.

See also W.S.P. B-7 to C-2-1959. This is a panorama of this area duplicating Shantz' panorama of 1914.



**LOCATION:**

Spearfish, South Dakota

Two miles north of Spearfish at the Junction U. S. 14 with U. S. 85. Picture was taken near public utility house on hills east of U. S. 85.

**ORIGINAL PICTURE:**

August 10, 1914, Shantz S-4-1914 (top).

**RETAKE:**

June 22, 1958, W.S.P. F-6-1958 (bottom).

**DESCRIPTION:**

This is a hill to the southeast of the picture point and it has good recovery of grass with the same *Rhus* spp. in the foreground. The old road ran along by the power lines and is still visible. In the background the hill has shown but little removal of the tree species.



**LOCATION:**

Sturgis, South Dakota

From old railroad bank six and four tenths of a mile southeast of Whitewood, South Dakota.  
The original photograph was taken from a moving train.

**ORIGINAL PICTURE:**

August 8, 1914, Shantz g-9-1914 (top).

**RETAKE:**

June 20, 1959, W.S.P. 2086 (bottom).

**DESCRIPTION:**

A considerable increase of the pine on the hillside, as well as many more cottonwoods along the river course.



**LOCATION:**

Timberlake, South Dakota

Fourteen miles south of the Junction of State 8 and State 63 on State 63.

**ORIGINAL PICTURE:**

July 7, 1927, Shantz W-4-1927 (top).

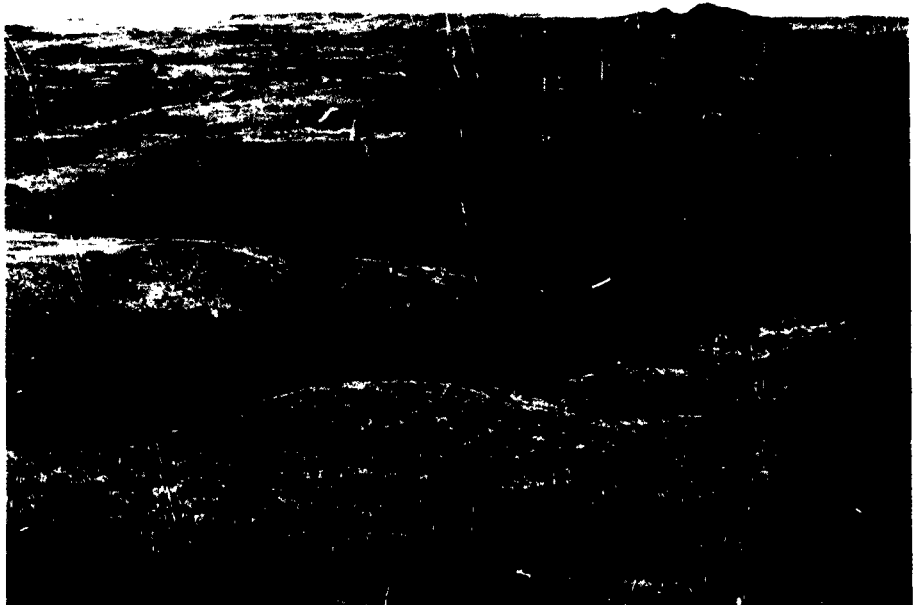
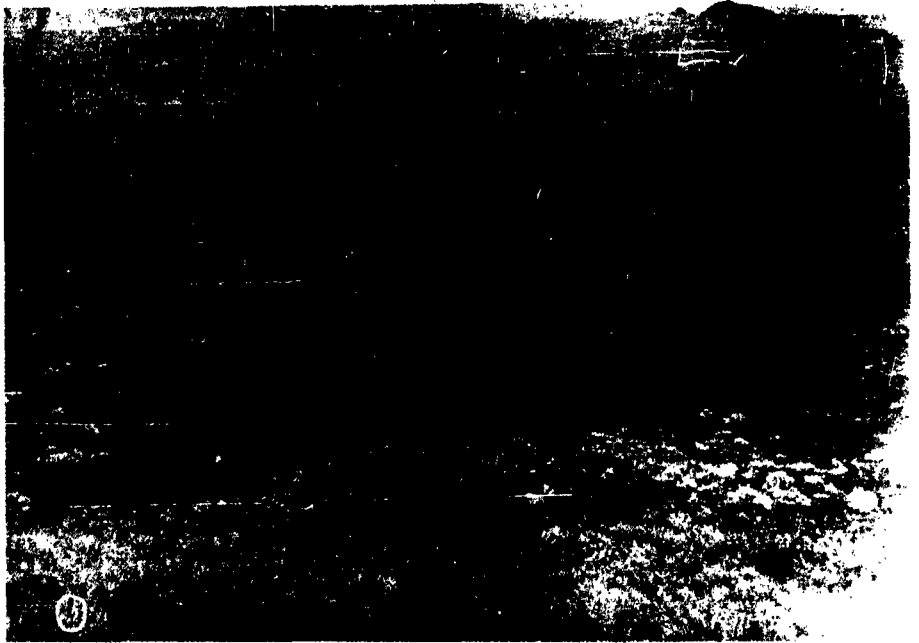
**RETAKE:**

June 21, 1959, W.S.P. C-12-1959 (bottom.)

**DESCRIPTION:**

The main grass in the original picture and the retake is *Stipa comata* Trin. and Rupr. The most obvious change has been in the increase in the trees in the ravine bottoms which is mainly *Salix* spp. in the bottom and *Prunus* spp. on the sides.





**LOCATION:**

Timberlake, South Dakota

On State Highway 63, nineteen miles north of U. S. Highway 212 just beyond the Moreau River.

**ORIGINAL PICTURE:**

July 11, 1927, Shantz W-5-1927 (top).

**RETAKES:**

June 21, 1959, W.S.P. No. 2090 (bottom).

**DESCRIPTION:**

One of a series of panoramic pictures taken from this point. A new road has interfered with the new picture point. This is in the so-called Clay-Breaks country. Aside from the various species of *Stipa* which seem to be more abundant in the new picture, the shrubs are still the same. The trees are *Fraxinus* spp. and *Ulmus* spp. The shrubs are mainly *Shepherdia canadensis* (L.) Nutt.

**LOCATION:**

White River, South Dakota  
Four miles south of Whitewater on the Little Whitewater River.

**ORIGINAL PICTURE:**

July 2, 1927, Shantz N-2-1927 (top).

**RETAKE:**

June 16, 1958, W.S.P. C-8-1958 (bottom).

**DESCRIPTION:**

The original picture shows much *Andropogon scoparius* Michx. There seems to be very little of this grass left in the retake, but *Stipa viridula* Trin. and *Bouteloua gracilis* (H.B.K.) Lag. are very common. The trees along the river are Cottonwood and Willow.

See also W.S.P. C-9 and C-10, 1958, from the same area.



**LOCATION:**

Whitewood, South Dakota  
Just outside of the town of Whitewood near railroad overpass.

**ORIGINAL PICTURE:**

July 16, 1908, Shantz F-2-1908 (top.)

**RETAKE:**

June 21, 1958, W.S.P. E-8-1958 (bottom).

**DESCRIPTION:**

The foreground in this picture is a disturbed area near an abandoned house and the vegetation consists of the following: *Bouteloua gracilis* (H.B.K.) Lag.; *Grindelia squarrosa* (Pursh) Dunal; *Artemisia frigida* Willd.; *Melilotus officinalis* (L.) Lam.; *Achillea millefolium* L.; *Plantago purshii* Roem. & Schult.; *Stipa comata* Trin. and Rupr.; *Carex filifolia* Nutt.; *Erysimum asperum* (Nutt.) DC.; *Bromus inermis* Leyss.; *Amorpha canescens* Pursh.; and *Stipa robusta* (Vasey) Scribn.

The hills in the background are covered with Ponderosa pines which has increased considerably since the 1908 picture. Typical short grass country in the foothills.



**LOCATION:**

Whitewood, South Dakota  
Just outside of the town of Whitewood near railroad overpass.

**ORIGINAL PICTURE:**

July 16, 1908, Shantz F-3-1908 (top).

**RETAKES:**

June 21, 1958, W.S.P. E-5 and E-6, 1958 (bottom).

**DESCRIPTION:**

The picture illustrates typically what happened near towns by new highway construction. The railroad overpass is where U. S. Highway 14 crosses the railroad. The old house immediately under the bridge is the same house as the 1908 picture. The tree vegetation has increased considerably. *Buchloe dactyloides* (Nutt.) Engelm. which Dr. Shantz mentions in the original picture is not very abundant now.

See also W.S.P. E-4 and E-7, 1958.





**LOCATION:**

Wounded Knee, South Dakota  
Three and six tenths of a mile east of monument below church.

**ORIGINAL PICTURE:**

July 4, 1927, Shantz R-10-1927 (top).

**RETAKE:**

June 15, 1958, W.S.P. B-3 and B-4, 1958 (bottom.)

**DESCRIPTION:**

A true short grass area with *Pinus ponderosa* Dougl. in the sheltered areas. The grass has improved considerably since the original photograph was taken. *Bouteloua gracilis* (H.B.K.) Lag. and much *Stipa comata* Trin. and Rupr. mixed together. Weeds are few which consist of: *Polygala alba* Nutt.; *Astragalus microlobus* A. Gray; *Psoralea tenuiflora* Pursh.; *Carex filifolia* Nutt.; *Koeleria cristata* (L.) Pers.; and *Bouteloua gracilis* (H.B.K.) Lag.

Some of these weeds were not present in the recent picture. See also W.S.P. B-5-1958, taken from the same place looking in the opposite direction. Considerable increase in tree growth.



**LOCATION:**

Buffalo, Wyoming

Approximately eight and six tenths of a mile southeast of Buffalo on country road leading to Crazy Woman Creek.

**ORIGINAL PICTURE:**

September 27, 1927, Shantz S-10-1927 (top).

**RETAKE:**

July 5, 1959, W.S.P. I-10-1959 (bottom).

**DESCRIPTION:**

The original picture shows a very much overgrazed range. The grasses consisting of depauperate *Bouteloua* plants, *Carex filifolia* Nutt., and some *Phlox spp.* The retake shows an improved range with a fair amount of *Bouteloua gracilis* (H.B.K.) Lag. However, *Carex filifolia* Nutt. is still abundant and there is some *Stipa spp.* still present.



**LOCATION:**

Buffalo, Wyoming  
Twelve miles west of Buffalo, Wyoming on Highway 16.

**ORIGINAL PICTURE:**

July 22, 1927, Shantz AA-10-1927 (top).

**RETAKE:**

July 5, 1959, W.S.P. I-9-1959 (bottom).

**DESCRIPTION:**

The retake of this photograph was taken from a road cut so that the original picture was slightly higher. It shows, however, the revegetation of the distant slopes by *Pinus ponderosa* Dougl.



**LOCATION:**

Casper, Wyoming

Two miles south of Casper off of Mountain Drive (Extension of Walcott Street) on a bench above rifle range and golf course between water tank and high tension line, looking toward city.

**ORIGINAL PICTURE:**

August 20, 1916, Shantz M-11-1916 (top).

**RETAKE:**

July 7, 1959, W.S.P. J-4-1959 (bottom).

**DESCRIPTION:**

The original picture shows *Koeleria cristata* (L.) Pers. and *Carex filifolia* Nutt. as the main plants. The same plants are present in the retake, although *Stipa* spp. is very abundant.

See also W.S.P. J-6 and J-7, 1959.





**LOCATION:**

Casper, Wyoming

Two miles south of Casper off of Mountain Drive (Extension of Walcott Street) on a bench above rifle range and golf course between water tank and high tension line, looking south toward mountains.

**ORIGINAL PICTURE:**

August 21, 1916, Shantz N-2-1916 (top.)

**RETAKE:**

July 7, 1959, W.S.P. J-9-1959 (bottom).

**DESCRIPTION.**

The original picture has much *Artemisia* spp. and *Koeleria cristata* (L.) Pers. In the retake the *Artemisia* has lessened and there is more grass covering. *Koeleria cristata* (L.) Pers. is abundant and also *Stipa comata* Trin. and Rupr.



**LOCATION:**

Casper, Wyoming

On Ralph Matheson's ranch on a ridge near the foot of the mountains, WSW of ranch house.

**ORIGINAL PICTURE:**

August 21, 1916, Shantz N-5-1916 (top.)

**RETAKE:**

July 7, 1959, W.S.P. J-10-1959 (bottom).

**DESCRIPTION:**

The pines here consist of two species. *Pinus ponderosa* Dougl. and *Pinus flexilis* James. The grass is mainly *Koeleria cristata* (L.) Pers. and *Carex filifolia* Nutt. There has not been much change here. The same trees are present and very little reproduction. This is an open exposed ridge, exposed to high winds. At the time the picture was taken it was necessary to hold the tripod down.



**LOCATION:**

Cody, Wyoming

South fork of the Shoshoni River take road two miles west of Cody and 29 miles up the valley just before road crosses river.

**ORIGINAL PICTURE:**

September 1, 1937, Shantz P-2-1937 (top).

**RETAKE:**

August 14, 1960, W.S.P. G-1-1960 (bottom).

**DESCRIPTION:**

This original picture was evidently taken from low road along side of the old road which has been completely dug out as a gravel pit for regrading the road. The original cover as described by Dr. Shantz consisted of *Stipa comata* Trin. and Rupr., *Poa* spp., *Koeleria cristata* (L.) Pers., *Opuntia polyacantha* Haw., and *Artemisia frigida* Willd. These plants are still in evidence, but the grazing is much more intense and the *Artemisia* is more predominant in the later picture.

See also W.S.P. G-4 and G-5, 1960, taken in the same area.



**LOCATION:**

Cody, Wyoming

Approximately 100 feet north of Buffalo Bill Statue. Fill for improving statue grounds changes location somewhat.

**ORIGINAL PICTURE:**

July 24, 1927, Shantz BB-8-1927 (top).

**RETAKE:**

July 4, 1959, W.S.P. I-1-1959 (bottom).

**DESCRIPTION:**

Very little difference in these two pictures. The *Pinus ponderosa* Dougl. on the mountains has thickened up somewhat. The grasses mainly *Stipa* spp. about the same in both pictures, with the exception of where fill has covered grass. *Artemisia* spp. in bottom land similar and the cottonwoods along seep bank are the same.





**LOCATION:**

Crazy Woman Creek, Wyoming

County road leading east from Buffalo to six miles at fork in road, turn left along road that eventually leads to Clearmont. Twenty one miles from Buffalo, Wyoming.

**ORIGINAL PICTURE:**

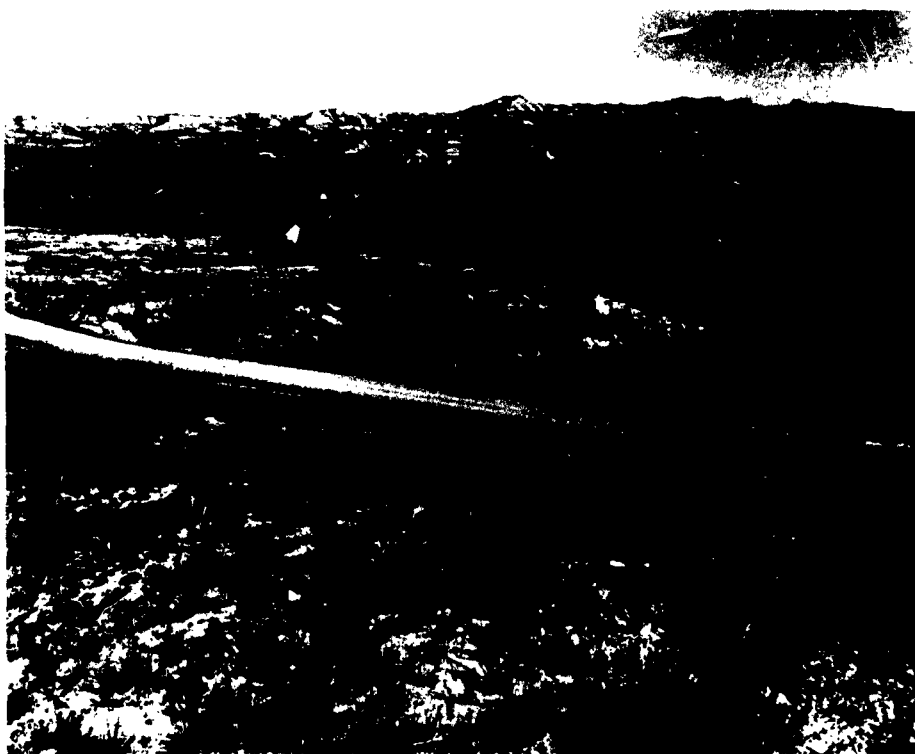
September 27, 1917, Shantz S-12-1917 (top).

**RETAKE:**

July 5, 1959, W.S.P. I-12-1959 (bottom).

**DESCRIPTION:**

Ranch house is the same. Some of the buildings are the same, with slight modification and modern adjustments. This is one of the larger ranches in the area, although isolated, is much used.



**LOCATION:**

Crazy Woman Creek, Wyoming

County road leading east from Buffalo to six miles at fork in road, turn left along road that eventually leads to Clearmont. Twenty one miles from Buffalo, Wyoming.

**ORIGINAL PICTURE:**

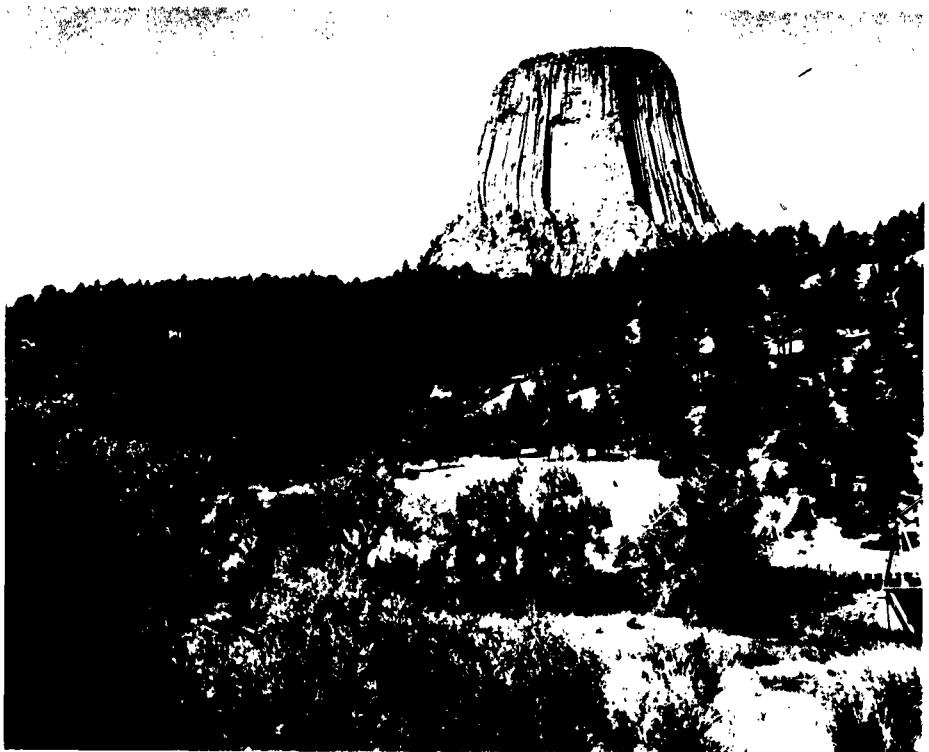
September 27, 1917, Shantz S-11-1917 (top).

**RETAKES:**

July 5, 1959, W.S.P. I-11-1959 (bottom).

**DESCRIPTION:**

These two pictures are remarkably alike in spite of some forty years difference in time. The modern county highway has been well-graded. Also original highway (note old Ford) followed the contours of the land. The scar is still visible in the new picture. This was taken about three tenths of a mile from ranch house along main road.



**LOCATION:**

Devil's Tower, Wyoming

At entrance to Devil's Tower National Monument, Wyoming, just beyond administration booth.

**ORIGINAL PICTURE:**

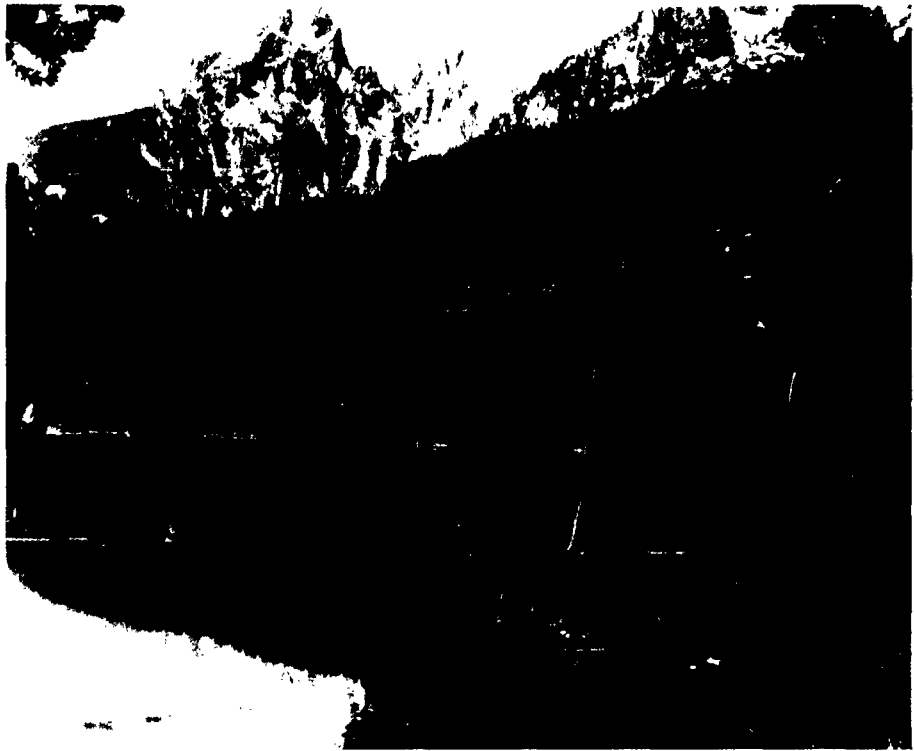
July 12, 1927, Shantz Y-10-1927 (top).

**RETAKES:**

August 13, 1960, W.S.P. F-2-1960 (bottom).

**DESCRIPTION:**

Very little change in this area except for creek bed which is changed probably due to abutment and protective devices of bridge. The bridge is dated 1928, which was the year after the original picture was taken. However, the clump of cottonwoods just to the left of the bridge abutment are in the original picture. One of the boles has been cut and is only a stump. The same snags are on the hillsides.



**LOCATION:**

Grand Teton, Wyoming  
Grand Teton National Park, String Lake Road.

**ORIGINAL PICTURE:**

July 12, 1931, Shantz M-5-1931 (top).

**RETAKES:**

August 18, 1960, W.S.P. H-8-1960 (bottom).

**DESCRIPTION:**

This is one of a series of pictures taken in the Grand Tetons. Most of them were hard to locate because of changes due to park construction. This is very close to the exact site of this picture, and aside from some recovery of the pines, there is not much change in the landscape.





**LOCATION:**

Hulett, Wyoming

One half mile north of Hulett, Wyoming on bluffs over road to Alzada, Montana.

**ORIGINAL PICTURE:**

July 18, 1927, Shantz Z-3-1927 (top.).

**RETAKE:**

June 18, 1959, W.S.P. A-5-1959 (bottom).

**DESCRIPTION:**

The original tree cover is mainly *Pinus ponderosa* Dougl. In Dr. Shantz' original photograph he listed the following plants as being dominant in the area: *Pinus ponderosa* Dougl.; *Carex filifolia* Nutt.; *Bouteloua gracilis* (H.B.K.) Lag.; *Koeleria cristata* (L.) Pers.; *Stipa comata* Trin. and Rupr.; *Phlox* spp.; *Antennaria* spp.; and *Helianthus* spp.

In the retake the Ponderosa pine has taken over the area. However, the photographic position is exact. The stump of the tree on the left of the original picture is still present in the retake, scars and all. The stumps left from the sawed off limbs in the original picture (center foreground) are still present, although in the shade. The tree on the right side of the original picture with a large basal scar is merely a stump now, but the scar still shows. All of the plants in Dr. Shantz' list are present in the retake, except in less quantities. The dominant grass at the photographic point is *Stipa comata* Trin. and Rupr.

Finding of this photographic point was a fortunate set of circumstances, but it illustrates that with time one can find most of the places if you have the patience.



**LOCATION:**

Hulett, Wyoming

One half mile north of Hulett, Wyoming on bluffs over road to Alzada, Montana.

**ORIGINAL PICTURE:**

July 18, 1927, Shantz Z-4-1927 (top).

**RETAKE:**

June 18, 1959, W.S.P. No. 2077 (bottom).

**DESCRIPTION:**

Another picture from the same photographic point at Hulett shows the build-up in vegetation, mainly *Pinus ponderosa* Dougl. on the hillside. However, in the recent photograph the level river bottoms are cultivated. The main shrubs above the yellow pines are *Rhus* spp. and *Juniperus* spp.



**LOCATION:**

Story, Wyoming

One mile south of Story turn off on high hill one half mile south of Massacre Hill Monument.

**ORIGINAL PICTURE:**

September 26, 1917, Shantz S-4-1917 (top).

**RETAKES:**

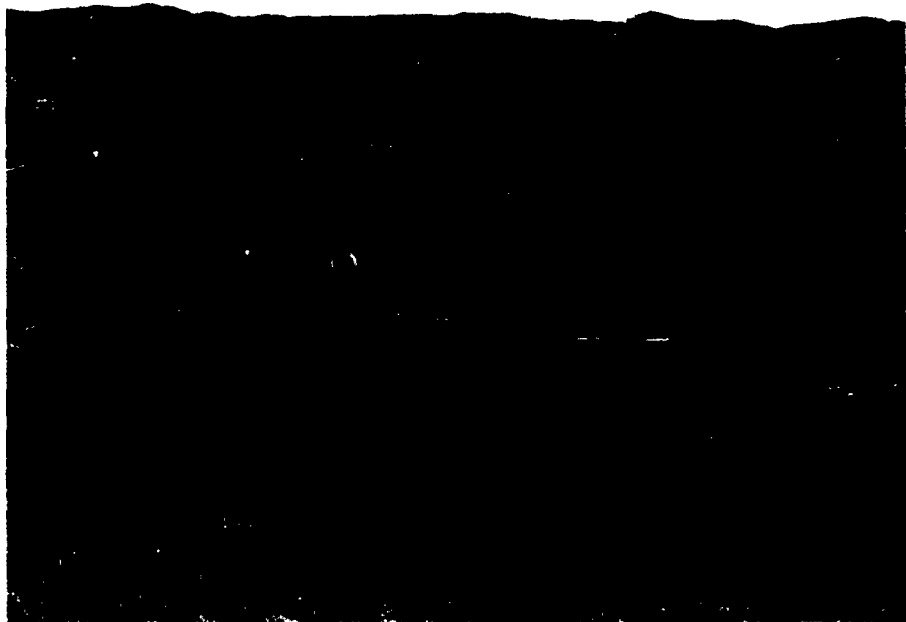
July 5, 1959, W.S.P. I-4-1959 (bottom).

**DESCRIPTION:**

In almost the center of the original picture is the Massacre Hill Monument, whereas in the new picture it is off to the right of the main road and has a gravel road leading up to it. The vegetation of this picture is almost exactly the same as S-2-1917



1970-1971



**LOCATION:**

Story, Wyoming

One mile south of Story turn off on high hill one half mile south of Massacre Hill Monument.

**ORIGINAL PICTURE:**

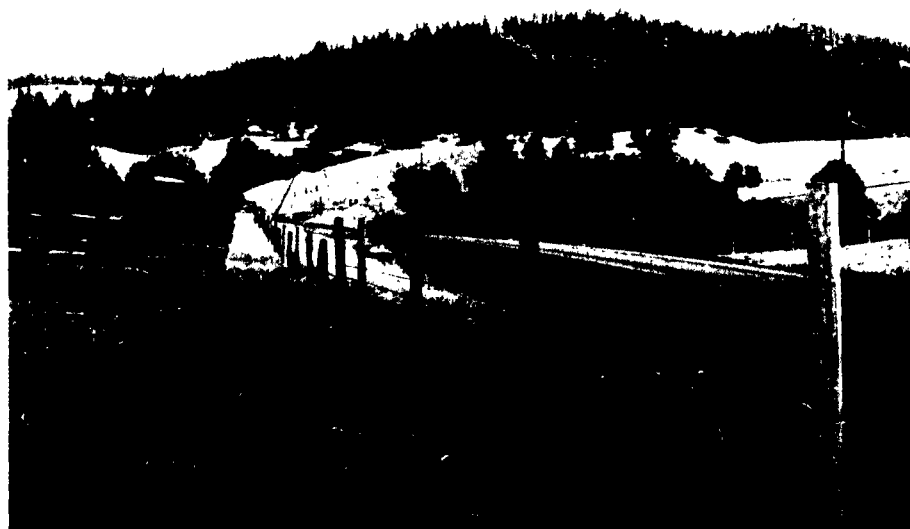
September 26, 1917, Shantz S-2-1917 (top).

**RETAKE:**

July 5, 1959, W.S.P. I-2-1959 (bottom).

**DESCRIPTION:**

Dr. Shantz took a panorama from the top of this hill, which has a surveyor's bench mark on it. The panorama is S-2 to S-6, 1917. Only two of these panoramic set of pictures are included in this report. The grass in the original picture was *Bouteloua gracilis* (H.B.K.) Lag., along with much *Carex filifolia* Nutt. The dark shrub is *Rhus* spp., and the light colored shrub in the grass is *Artemisia* spp. In the retake the same plants are still present and there is not too much change. The *Rhus* seems to have lessened and the *Artemisia* increased.





**LOCATION:**

Sundance, Wyoming

On U. S. Highway 14, twenty miles west of Sundance, Wyoming, one and two tenths of a mile east of Devil's Tower Junction. Position not quite exact in order to get around snow fence.

**ORIGINAL PICTURE:**

July 17, 1927, Shantz Y 8-1927 (top).

**RETAKE:**

June 18, 1959, W.S.P. A-1-1959 (bottom).

**DESCRIPTION:**

In Dr. Shantz' original description he says this is the Grama-Stipa type of pine ecotone. In addition to the *Bouteloua* spp. and *Stipa* spp. he has mentioned three forbs.: *Brauneria angustifolia* (D.C.) Heller; *Psoralea argophylla*, Pursh.; and *Artemisia gnaphalodes* Nutt.

The same plants with the exception of *Brauneria angustifolia* (D.C.) Heller are still present. The buildings in the original picture can be located by their foundations, although the buildings have long since gone.



**LOCATION:**

Ten Sleep, Wyoming

Thirty two miles east of Ten Sleep, Wyoming on U. S. Highway 16. One mile east of pass and one quarter mile east of new road.

**ORIGINAL PICTURE:**

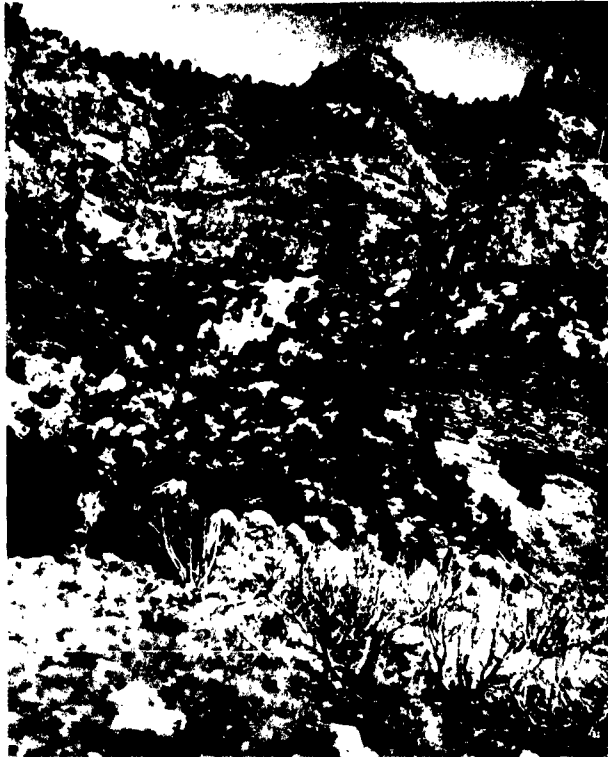
July 22, 1927, Shantz BB-4-1927 (top).

**RETAKES:**

July 6, 1959, W.S.P. J-1-1959 (bottom).

**DESCRIPTION:**

The forest is the Lodge Pole Pine type at timberline. This is the Mountain Meadow type in the Big Horn Mountains. The Lodge Pole Pine has increased in quantity on the mountainside. The foreground in the retake shows disturbance due to road grading. Otherwise remarkably little change.



**LOCATION:**

Thermopolis, Wyoming

Seventeen miles south of Thermopolis, Wyoming, in Wind River Canyon looking across river NNW. Original picture taken from railroad. Retake from opposite side.

**ORIGINAL PICTURE:**

August 22, 1916, Shantz h-10-1916 (top).

**RETAKE:**

July 6, 1959, W.S.P. J-3-1959 (bottom).

**DESCRIPTION:**

The highway and the railroad are on opposite banks of the river in the canyon so that this retake is not in the exact location. However, it is one of the few pictures that actually show some geological change. A large section of the central bluff has caved in and fallen down since the original picture was taken. The vegetation is approximately the same, and aside from the angle of the retake this picture matches very well.